AMERICAN GAS ASSOCIATION MONTHLY

Vol. V No. 5

MAY, 1923

"..... and I feel, after having come to know personally of the splendid work which the American Gas Association is doing, that every gas company in the country owes it to its customers to be a member of that organization. It happens that there are many other reasons that make membership desirable and even necessary, but if there were none, the obligation of a company to its customers to render the best possible service and to keep fully abreast of progress in the industry, should and in my judgment does make membership in the National Association a duty."

PHILIP H. GADSDEN
in address before the
Eastern States Gas Conference

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FOR STATEMENTS AND OPINIONS CONTAINED IN PAPERS AND DISCUSSIONS APPEARING HEREIN, THE ASSOCIATION DOES NOT HOLD ITSELF RESPONSIBLE

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Vol. V MAY, 1923 No. 5

The Noiseless Engine

How often have we heard the remark—"why, you can hardly hear it run!"

With ear pressed close to the engine hood the listener stands beside the automobile and marvels at the noiseless qualities of the mechanism within.

How smooth! What perfection of workmanship! The acme of mechanical efficiency and engineering service! Surely such a product must give the maximum of service with the maximum of efficiency and economy. The silence, the smoothness of its working are the visible proofs.

And it may be so. However, the important thing is that the listener goes away convinced in his own mind that it is so.

But is not a great industry such as ours analogous to the machinery within the hood?

Yes. It is just as much a machine as that other. In fact, it is more complicated. There are many more moving parts engaging their respective cams and gears and valves and running true and smoothly so that they may deliver to the public the maximum of service with the greatest efficiency and economy possible.

But, unfortunately, the public can not put its ear to the hood and listen. And, unfortunately, but true nevertheless, the noiseless qualities of our machine do not strike the public at once as an astounding proof of efficiently rendered service. The smoothness of our functioning is just silence to them.

Unlike the engine under the hood we must make a noise. Not the jarring noise of grating parts and poorly adjusted gears and lack of lubrication, but the harmonious purr and whirr of effective work being done that we hear ourselves. The public must hear the wheels go round. The public's ear must catch the sound of our great machine running. And the public must constantly hear it, not spasmodically, but night and day, week in and week out—all the time.

Our noiseless engine gets us nowhere with a public that in this day and age has become accustomed to marvelous inventions, mechanical devices and labor saving developments that efficiently and silently serve its every need. We must continually tell this public everything of the wonders and fascinating movements of our silent engine. We must lift the hood and show all of the integral parts that function harmoniously without ceasing.

AMERICAN
GAS ASSOCIATION
MONTHLY

Vol. V MAY, 1923 No. 5

An Analysis of the House Heating Load*

N. T. SELLMAN, Asst. Secretary-Manager, A. G. A.

THE GAS industry is at present in a very interesting stage of development; new uses for gas are being sought and an increased effort is urged to bring about the more general use of gas in those instances where our success is still questioned. One phase of this development that is receiving considerable attention is the more general use of gas for house heating purposes.

The application of gas to space heating is almost as old as the industry and the only new phase involved is its exclusive use for house heating, either by means of a central heating plant or small individual room heaters. Practically every gas company has countenanced, without serious thought, the sale of small heaters, presumably for auxiliary use and they only raise the question about the desirability of the heating load when it involves the use of gas as the sole source of heat for a building. Upon careful investigation we will find that the auxiliary heaters are not used exclusively for fall and spring heating, but fully as much as boosters for inadequate central coal heating plants during the extreme cold waves. Furthermore, the daily send-out of most large gas companies shows that the consumption of gas is inversely proportional to the temperature, with the rate of increase greatest at the extremely low temperatures. This can only indicate that many heaters are used only at these periods and that even ranges and lights are brought into service as auxiliary sources of heat.

Since gas is being considered more than ever as a fuel, it does not seem consistent to hesitate in developing its largest field of expansion, particularly when it is an application that suits the purpose so well that the public use it in spite of makeshift appliances and other

*Paper read before the Eastern States Gas Conference.

inconveniences. However, before proceeding to give some comparative figures to justify my views, I wish to recommend that if heating is to be encouraged through the sale of appliances for this purpose, it might then be most satisfactorily accomplished by central heating boilers, properly installed and flue connected. By doing this we are at least making installations of which we can be proud and which will, through the satisfactory service they render, pave the way for the more general use of gas for other purposes.

In order to enable each gas man to study his own local situation, I will show just how the local weather reports can be used to estimate the gas consumption for each prospective installation and how the exact temperature readings can be used to check gas bills, and, when necessary, satisfy consumers where it appears that they have received a high gas bill.

I will also give a few comparisons showing how the house heating load compares with other loads with which we are more familiar. All the concrete examples which I am quoting are based on data applicable to this vicinity, and the tables presented later in this paper will show how these examples and methods of calculation can be applied to any local condition.

As there are numerous efficient boilers on the market, almost any of which will yield an efficiency of 80%, this will be the efficiency assumed throughout. I am also assuming, in all my examples, a calorific value of 600 B.t.u.'s. On this basis we can allow exactly 2 square feet of boiler rating per cu. ft. of gas. Therefore, if we assume an installation having exactly 1,000 sq. ft. of steam radiation and allowing the customary 25% for risers and returns and an additional 25% for quick heating under thermostatic control, we find that this installation will call for a boiler having a rating of approximately 1,600 sq. ft. Dividing this by 2, it will give us the gas consumption of the boiler, namely 800 cu. ft. per hour.

For a boiler selected according to the above calculations, the burners will be in operation 15 hours on a day, having a temperature of 0° F. and, therefore, the consumption on this maximum day will be 12,000 cu. ft. During an average January, which is the coldest month, this consumption will be 211,000 cu. ft. and for the entire heating season, the consumption will be approximately 1,050,000 cu. ft.

Let us see how this yearly consumption compares with that derived from domestic gas ranges. The average range yields an annual consumption of 15,000 cu. ft.; therefore, if we divide the annual consumption from the assumed heating installation of 1,000 square feet by 15,000 we find that it will be necessary to install 70 gas ranges to produce an equivalent annual consumption.

The maximum hour demand of 70 gas ranges will be approximately at the rate of 30 cu. ft. per range, or 2,100 cu. ft. You will, therefore, see that to obtain the same annual sales of gas through gas ranges as we will get from the assumed heating installation, the maximum hour demand will be approximately 2½ times as great. In addition to increased service demand, the 70 gas ranges will in many communities call for 70 independent services and 70 meters; even in the case of an apartment house, containing 70 apartments, it would be necessary to supply the 70 meters and a service large enough to

take care of 2½ times the maximum hourly consumption of the heating installation.

From these examples it is clear that from the standpoint of distribution, service and meters, the house heating installation is worthy of careful consideration. The only condition produced by house heating which should in any way raise a question is that of plant capacity, which is directly affected by the severity and duration of the coldest weather.

The worst condition that the weather records in this vicinity have ever shown is 3 consecutive days of 0° temperature.

In the case of the installation which I have assumed the maximum day will produce a consumption of 12,000 cu. ft., therefore, for 3 such consecutive days this consumption will be 36,000 cu. ft. In the case of the gas ranges the gas consumption for an equivalent period of time will be approximately 200 cu. ft. per range, which will produce a demand of 14,000 cu. ft. The ratio of the demand on the plant of the house heating installation is, therefore, 2.57 times greater than the range demand. As viewed from our present knowledge of the subject this phase of the house heating load may in some cases be serious enough to warrant all forms of space heating being discouraged, but the situation may be improved and this difficulty lessened by developing summer water heating, refrigeration and some industrials. It is along this line that our effort should be directed—and there is also deserving of your consideration the advisability of providing attractive rates for "off peak" consumption of this summer load character.

The few facts just stated regarding the house heating load are applicable to all conditions in proportion to the local weather conditions. The detailed study which is necessary for each local gas company to make involves, broadly, three considerations—first, what is the existing load, second, what will be the exact nature of the local heating load, and third, what consumption can be developed that will tend to neutralize the effect of the heating load?

The first consideration that I have mentioned is one with which each gas company is already fully acquainted. The one most important factor in this consideration is—what is the present maximum day's send-out and what is the ratio of this maximum day's send-out to the yearly send-out? Some gas companies are fortunate enough to have the maximum day's send-out during a period not related to the heating load. A gas company having this situation should be able to undertake some house heating without further consideration.

Before I enter upon the second consideration, which is the one that I am attempting to present to you in detail, I will dispose of the third.

The consumption which can be developed for strictly summer load or consumption which might vary directly with the temperature has received even less consideration than house heating. The possibility of refrigeration by gas is theoretically a most logical counterpart to house heating. The demand for refrigerants is directly proportional to the temperature, whereas heating is inversely proportional to the temperature. The possibilities of summer water heating for large buildings must be realized. We have the appliances and the necessary data for aiding us to secure this attractive consumption. Recently several concerns have introduced to the plumbing trade water heaters which operate

on gas in the summer and heat by means of the central boiler in the winter; these appliances can be used to advantage for developing summer load when the central boilers are heated by fuels other than gas.

Most industrials have a fairly uniform load and could only be induced to develop maximum summer demands through favorable rates. There are a few industries, however, which have a decided summer peak which we should make every effort to secure as gas consumers. Industries of this character are ice cream cones, cracker baking and beverages.

The second consideration in importance, which I have purposely left for a final and detailed study, is to most gas men a new one, as it requires us to become familiar with all phases of the heating profession. The art of heating is now a comparatively exact science and is doubly so where gas is the fuel under thermostatic control. Such phases of heating, as estimating and locating the radiation, methods of piping risers and returns, and selecting from the various heating systems the one most suitable for each case are a study in themselves; fortunately these phases of heating do not require the gas man's detailed study.

Our responsibility as gas men consists of supplying the correct boiler size, based on the radiation installed, of recommending the proper accessories and control devices and, before gas is turned on, making an inspection.

In order to select the correct boiler size, we must know accurately what the boiler rating is under the local gas conditions. In order that all boilers will be rated on the same basis, the Committee on the Standardization of Gas Appliances has prepared a standard method of rating gas-fired steam boilers which will be presented for the approval of the membership of the American Gas Association at its next annual convention.

Knowing the correct boiler rating, it is a simple matter to select the suitable boiler size by following the rule of adding to the exact amount of cast iron radiation the sq. ft. of radiation represented in risers and returns and adding to this total 25% for quick heating when the boiler is operated under thermostatic control. In most cases the sq. ft. represented by risers and returns is proportionate to the sq. ft. of actual cast iron radiation and, as a result, it is common practice to simply add 25% for risers and returns to the sq. ft. of cast iron radiation. The first method, however, is more accurate and should always be used where there appears to be an excessive amount of piping.

To facilitate selling house heating boilers, we should have sufficient knowledge of our local weather conditions to enable us to estimate the probable gas consumption for the year for any given installation and we should also be able to apportion this gas consumption as it will be used from month to month. If we have this knowledge, it can often be used to advantage in checking the consumptions of actual installations, thus determining whether or not they are operating properly, and occasionally this knowledge can aid us in accounting for apparently high gas bills caused by extremely cold periods. In this connection, I have prepared the following table, which shows the monthly mean temperatures below 65° for various cities throughout the United States.*

The reason that the monthly mean

*Table No. 1.

TABLE 1

Listed in Order of Heating Load — City	Monthly Mean Temperature Below 65° F.												Total of Year	Percent Used in Maximum Month	Approximate Degree Days = Total x 30
	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.			
Galveston	12	9	3	–	–	–	–	–	–	–	2	9	35	34.3	1050
Jacksonville	11	8	3	–	–	–	–	–	–	–	4	10	36	30.6	1080
New Orleans	12	9	3	–	–	–	–	–	–	–	4	11	39	30.8	1170
San Antonio	14	11	3	–	–	–	–	–	–	–	6	12	46	30.5	1380
Phoenix	15	11	5	–	–	–	–	–	–	–	6	13	50	30.0	1500
Los Angeles	11	10	8	6	3	–	–	–	–	–	5	9	52	21.2	1560
Charleston	16	13	8	1	–	–	–	–	–	–	7	14	59	27.1	1770
Dallas	20	16	8	1	–	–	–	–	–	–	9	19	73	27.4	2190
Atlanta	23	20	13	4	–	–	–	–	–	3	13	20	96	23.9	2880
Memphis	25	22	13	3	–	–	–	–	–	3	14	21	101	24.7	3030
San Francisco	15	14	7	11	9	8	8	7	6	7	9	14	115	13.0	3450
Oklahoma City	30	27	16	5	–	–	–	–	–	4	17	26	125	24.0	3750
Asheville	30	27	20	11	2	–	–	–	–	10	20	27	147	20.4	4410
St. Louis	34	31	21	9	–	–	–	–	–	7	20	30	152	22.4	4560
Washington, D. C.	32	31	23	12	1	–	–	–	–	8	20	29	156	20.5	4680
Philadelphia	33	32	25	14	3	–	–	–	–	9	20	29	165	20.0	4950
Cincinnati	35	33	24	13	2	–	–	–	–	10	22	31	170	20.6	5100
Pittsburgh	34	33	25	14	2	–	–	–	–	10	22	30	170	20.0	5110
Seattle	26	25	21	16	10	5	1	2	7	14	21	24	172	15.0	5160
New York	35	34	27	17	6	–	–	–	–	9	21	31	180	19.4	5400
Kansas City	39	35	24	11	1	–	–	–	–	15	23	33	181	21.5	5430
Salt Lake City	36	32	24	15	7	–	–	–	–	13	25	33	185	19.5	5550
Denver	36	34	26	17	8	–	–	–	2	14	26	33	196	18.4	5880
Sante Fe	37	33	26	17	8	–	–	–	4	15	27	35	202	18.3	6060
Boston	38	37	30	20	8	–	–	–	2	13	24	33	205	18.5	6150
Cleveland	39	38	31	19	7	–	–	–	1	12	25	34	206	18.8	6180
Spokane	38	35	26	17	9	2	–	–	6	18	28	34	213	17.8	6390
Chicago	41	40	31	19	9	–	–	–	–	12	26	36	214	19.1	6420
Detroit	41	40	32	19	7	–	–	–	2	13	26	35	215	19.1	6450
Albany	43	41	33	19	6	–	–	–	3	15	27	37	224	19.1	6720
Buffalo	40	41	34	23	11	–	–	–	2	13	26	35	225	18.2	6750
Sioux City	49	45	32	17	4	–	–	–	1	14	31	42	235	20.8	7050
Helena	45	43	34	23	13	4	–	–	9	21	32	40	264	17.1	7920
St. Paul	53	50	37	19	7	–	–	–	5	17	34	46	268	19.8	8040
Bismarck	58	57	43	22	10	1	–	–	8	21	39	50	309	18.8	9270
Ideal Case	x	x	x	x	x	x	x	x	x	x	x	x	12x	8.3	365x where x = 65 – Temp.

temperatures are given below 65° is a matter that has been determined by experiment and from the data collected on many installations which prove conclusively that when the monthly mean temperature is 65° we start to consume gas for heating purposes. Furthermore, tests show that the gas consumption varies inversely with the temperature; in other words, on a day when the temperature is 20° below 65° we will consume twice as much gas as on a day when the temperature is 10° below 65°.

Allowing that these statements are true, the gas consumption for performing any unit of heating will be proportional to the total number of "degree days" during the heating season where "degree days" represents the summation of the year's daily mean temperatures below 65°.

For comparing the relative load of one city with another, as shown in the table, it is sufficient if we assume every month to have 30 days and merely sum up the monthly mean temperatures below 65°, and multiply this total by 30 and in this manner obtain the approximate number of "degree days."

You will note from the table, that

the heating load varies over a very wide range throughout the United States; Galveston, Texas, for example, has only 1050 "degree days" during the season, whereas Bismarck, N. D., has 9,270. Philadelphia, as might be expected, is approximately half-way between these two, having 4,950 "degree days."

Another interesting point brought out by this table is the fact that the Southern cities have a poorer load factor than the Northern cities; for example, Galveston will consume during the month of January 34.3% of the total amount of gas to be used during the entire year for heating, whereas Bismarck will use only 18.8% during the same month. The city having the best load factor is San Francisco, Cal., where the maximum month is only 13% of the yearly consumption, and what is even more remarkable, is the fact that heat will be required every month during the year. This latter feature is also true of Seattle, Washington.

Chart No. 1 shows, graphically, the relative heating loads for Bismarck, N. D., Philadelphia, Pa., San Francsico, Cal., and Galveston, Texas, and the curves obtained by plotting the mean monthly temperatures below 65° also indicate the relative consumption per unit of radiation for these various cities.

Chart No. 2 represents a monthly distribution of gas consumption for the same four cities but for a total annual heating load of 1,000,000 cu. ft. of gas. These curves show clearly how the load for a Southern city, such as Galveston, is very much poorer than either Bismarck or Philadelphia. Here again, you will note that the heating load for San Francisco is almost ideal.

Chart No. 3 gives the cu. ft. of gas per sq. ft. of radiation for the heating season for any climate, the climate being

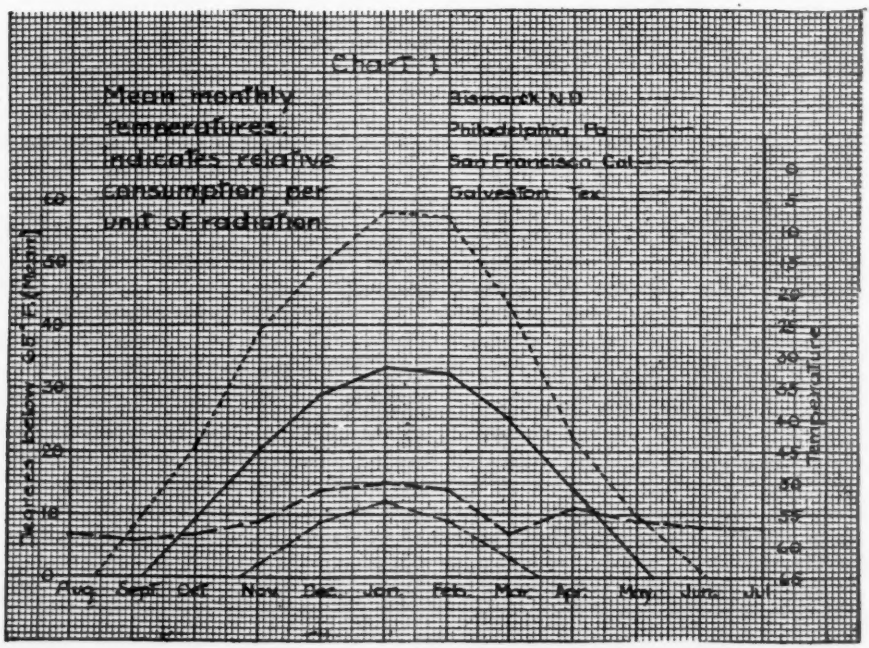
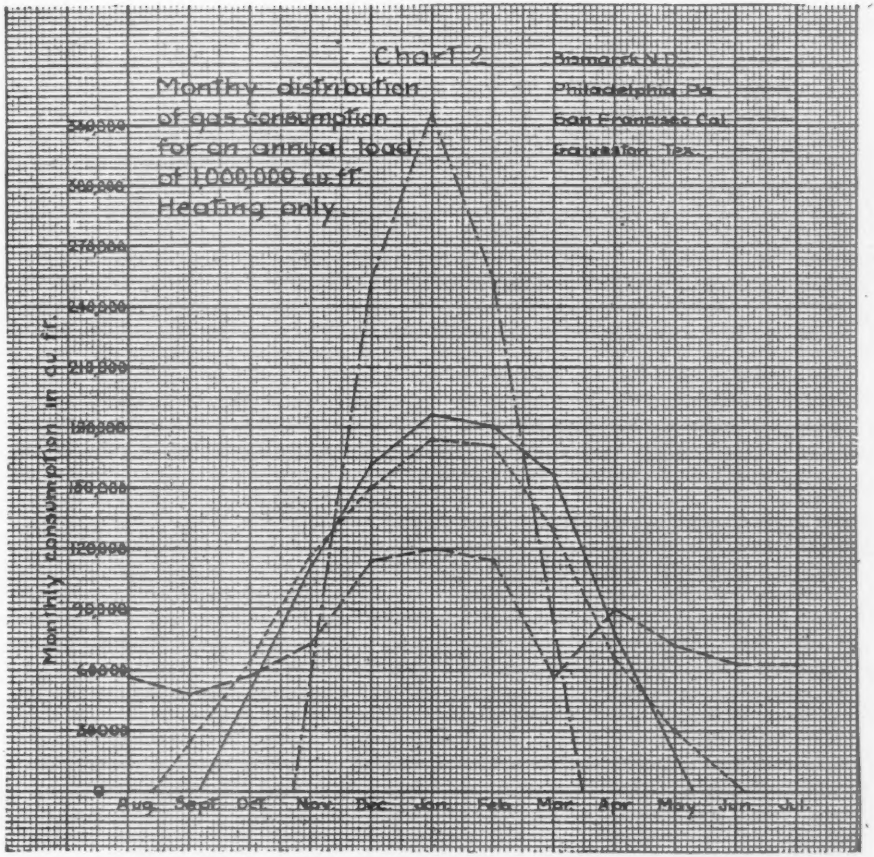


Chart 1
Mean monthly temperatures indicates relative consumption per unit of radiation
Bismarck N.D.
Philadelphia Pa.
San Francisco Cal.
Galveston Tex.
Degrees Below 65° F (Mean)
Temperature F
Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July



expressed in "degree days." A separate line for each even B.t.u. value, ranging from 400 to 1,000 B.t.u. makes this chart applicable for any heating condition in the United States.

The cu. ft. of gas per sq. ft. of radiation is expressed for both steam and hot water radiation. To show how this chart works, we will assume the case of Philadelphia where the approximate number of "degree days" is 4,950, as obtained from Table No. 1, and assume 600 B.t.u.'s per cu. ft. of gas. We find that it will require approximately 990 cu. ft. of gas per sq. ft. of steam radiation for the season or 495 cu. ft. of gas per sq. ft. of hot water radiation for the season.

All the consumption estimates that I have presented up to this point are based on the average temperature conditions for periods ranging from twenty to fifty years. The estimates are, therefore, perfectly fair for an average winter, but may prove either high or low for any particular year. For example, the average number of "degree days" in New York below 65° F. is 5276. (Using the exact number of days in each month.) During the winter of 1917-1918 it was necessary to provide

the heating load varies over a very wide range throughout the United States; Galveston, Texas, for example, has only 1050 "degree days" during the season, whereas Bismarck, N. D., has 9,270. Philadelphia, as might be expected, is approximately half-way between these two, having 4,950 "degree days."

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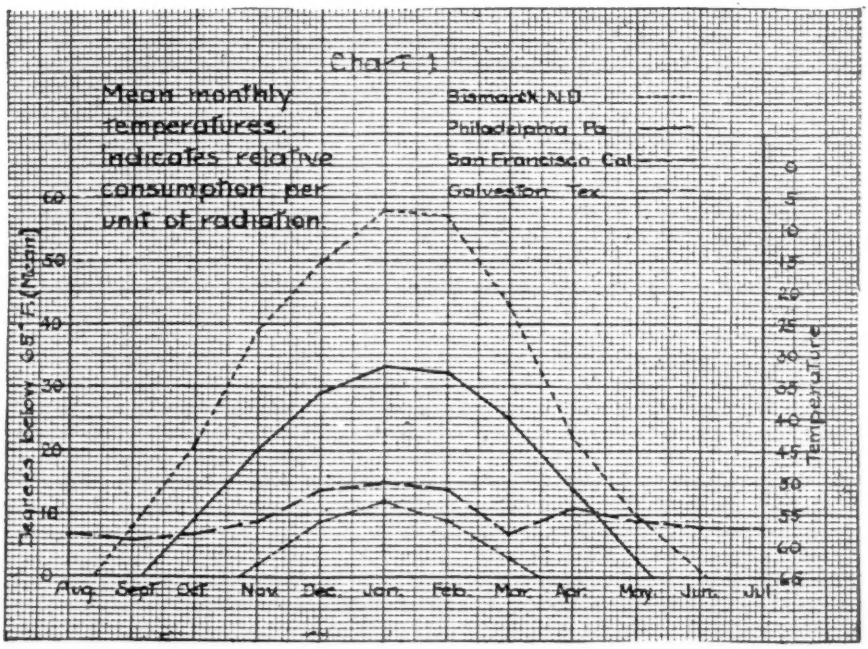

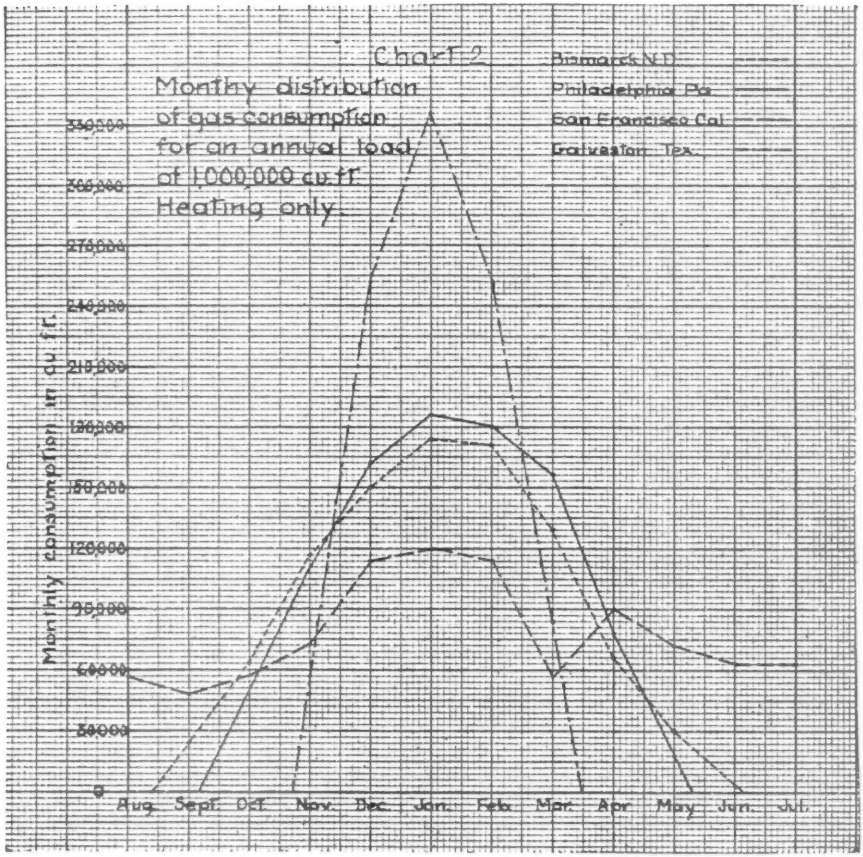
Chart 2
Monthly distribution of gas consumption for an annual load of 1,000,000 cu ft. Heating only.
Bismarck N.D.
Philadelphia Pa.
San Francisco Cal.
Galveston Tex.
Monthly consumption in cu. ft.
Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May Jun. Jul.

expressed in "degree days." A separate line for each even B.t.u. value, ranging from 400 to 1,000 B.t.u. makes this chart applicable for any heating condition in the United States.

The cu. ft. of gas per sq. ft. of radiation is expressed for both steam and hot water radiation. To show how this chart works, we will assume the case of Philadelphia where the approximate number of "degree days" is 4,950, as obtained from Table No. 1, and assume 600 B.t.u.'s per cu. ft. of gas. We find that it will require approximately 990 cu. ft. of gas per sq. ft. of steam radiation for the season or 495 cu. ft. of gas per sq. ft. of hot water radiation for the season.

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Chart 3
Chart giving the cu.ft. of gas per year of radiation for the heating season for varying climates and for the values of Gas Boiler efficiency 65%
Assumed
Degree Days.
Cu.ft. of gas per sq.ft. of hot water radiation per year.
Cu.ft. of gas per sq.ft. of steam radiation per year.
B.T.U. value of gas.
400
500
600
700
800
900
1000

heat for 5898 "degree days," while in the following winter of 1918-1919 there were only 4636 "degree days." This means that during the winter of 1917-1918 the gas consumption per sq. ft. of steam radiation would be approximately 1170 cu. ft. for the season, while in 1918-1919 the corresponding consumption would be approximately 920 cu. ft., whereas the average figure for New York City is 1050 cu. ft.

The distribution of the cold weather during the winter months is also quite variable and a careful study of what may be expected will be helpful in explaining to customers what at first glance appears to be an excessive monthly consumption. For example, during an average winter, January will require 20.1% of the total quantity of gas used for heating during the year. For an installation having 1,000 sq. ft. of steam radiation this will call for a gas consumption of 211,000 cu. ft. for this month. January, 1918 accounted for 22.9% of the year's heating load and a corresponding consumption of 268,900 cu. ft., while in 1919, January accounted for 19.9% and 183,500 cu. ft. When these facts are studied and understood, it is an easy matter to explain satisfactorily an apparently high bill.

A poorly proportioned installation, over or under heating, a faulty thermostat and other defects can be determined by checking an installation against the temperature and your local unit consumption figures. A table similar to No. 2 should be made up by each gas company for a unit block of radiation and added to each month after the temperatures from the weather bureau reports are secured. This can then be used to account for deviations from normal or average conditions.

I am sure that you will all find house heating a most interesting subject if followed and studied in this manner. It will result in satisfactory installations and I assure you that by doing this you are making friends for the gas company. We can never popularize or extend the use of gas unless the application is of such a character that its requirements can be fulfilled better with gas than with any other medium. This, fortunately, is the case in central house heating.

TABLE 2.

Month	Days	Monthly Mean Degrees Fahr. Below 65°			Summation of Daily Mean Degrees Fahr. Below 65°			Percentage of Gas Consumption by Months			Gas Consumption in Months in Cu. Ft. Based on 1,000 Sq. Ft. of Cast Iron Steam Radiation		
		Winter 1917-1918	Winter 1918-1919	Average Since 1871	Winter 1917-1918	Winter 1918-1919	Average Since 1871	Winter 1917-1918	Winter 1918-1919	Average Since 1871	Winter 1917-1918	Winter 1918-1919	Average Since 1871
Sept.	10	2.0	2.2	–	20	22	–	.3	.5	–	3500	4600	–
Oct.	31	13.0	6.4	9.0	403	198	279	6.8	4.3	5.3	79800	39700	55700
Nov.	30	23.0	19.3	21.0	690	579	630	11.7	12.5	11.9	137200	115300	125000
Dec.	31	40.0	26.0	30.9	1240	806	958	21.1	17.4	18.1	247500	160500	190000
Jan.	31	43.4	29.8	34.2	1345	924	1060	22.9	19.9	20.1	268900	183500	211000
Feb.	28	35.4	30.3	34.3	991	848	960	16.8	18.3	18.2	197000	168800	191000
Mar.	31	23.8	23.0	26.8	738	713	831	12.5	15.4	15.8	146500	142000	166000
Apr.	30	15.2	16.2	16.1	456	486	483	7.7	10.4	9.2	90300	96000	96600
May	15	1.0	4.0	5.0	15	60	75	.2	1.3	1.4	2300	12000	14700
Total	237				5898	4636	5276	100.0	100.0	100.0	1,173000	922400	1050000

AN APPRECIATION

The following letter received from one of our company members is a most encouraging indication of the tangible results achieved by the Association's Committee on Insurance.

Mr. J. G. Reese of the Baltimore Consolidated Gas, Electric Light and Power Company is Chairman of the Insurance Committee for the year 1923 and would be pleased to hear from other companies who have had their plants re-rated under the new schedule.

WASHTENAW GAS COMPANY

Ann Arbor, Michigan, January 27, 1923.

American Gas Association,
342 Madison Ave.,
New York, N. Y.

Gentlemen:

I think you may be interested in knowing that pursuant to the circular sent out by the Fire Insurance Committee last summer this Company made application for a re-rating of its plant for fire insurance purposes under the new schedule. An inspection was recently made with the result of an average reduction in our insurance rate of nearly 50 per cent. This is certainly very satisfying and I am writing in appreciation of the excellent work which the Committee did in getting across this schedule.

Yours very truly,
(Signed) H. W. DOUGLAS.

* * *

Engineering Students Want Summer Employment

It has been brought to the attention of headquarters that students taking the engineering courses at Princeton University are required to work in an engineering line for one summer. We are advised that there will be a number of these students available from June 15 to September 15.

This is a splendid opportunity for our members to actively cooperate with the committee on Cooperation with Educational Institutions and by giving employment to these men aid in developing the coming gas men.

Communications should be addressed to Arthur M. Greene, Jr., Dean, School of Engineering, Princeton University, Princeton, N. J.

GENERAL

CHAIRMEN OF GENERAL COMMITTEES ORGANIZED TO DATE

Accident Prevention—F. W. Fisher, Rochester, N. Y.

Amendments to Constitution—Wm. J. Clark, Mt. Vernon, N. Y.

American Engineering Standards Committee, Representative on—A. H. Hall, New York, N. Y.—(Alternate Representative) W. J. Serrill, Philadelphia, Pa.

Representatives on Sectional Committees—Underground Construction—National Electrical Safety Code—C. C. Simpson, New York, N. Y. Illumination, Nomenclature and Photometric Standards— W. J. Serrill, Philadelphia, Pa. Ventilating Code—Geo. E. Bennitt, New York, N. Y. Safety Code Correlating Committee—W. R. Addicks, New York, N. Y.—(Alternate Representative) Donald McDonald, New York, N. Y.

Award of Beal Medal—R. B. Brown, Milwaukee, Wis.

Chamber of Commerce—D. D. Barnum, Boston, Mass.

Cooperation with Educational Institutions—C. N. Chubb, Davenport, Ia.

Finance—James Lawrence, New York, N. Y.

Gas Safety Code—W. R. Addicks, New York, N. Y.

Gas Standards—J. B. Klumpp, Philadelphia, Pa.

Geographic Sections—L. R. Dutton, Jenkintown, Pa.

National Fire Protection Association—R. S. Doull, New York, N. Y.

Nominating—C. M. Cohn, Baltimore, Md.

Rate Fundamentals—R. A. Carter, New York, N. Y.

Rate Structure—T. V. Purcell, Chicago, Ill.

Standard Gas Appliance Specifications—W. T. Rasch, New York, N. Y.

United States National Committee of International Commission on Illumination, Representative on—Howard Lyon, Gloucester, N. J.

The Association's Work

From an Address by Oscar H. Fogg before the Eastern States Gas Conference, Philadelphia, Pa., April 11, 1923. (Editor's Note.)

In whatever branch of the business we may be engaged—along whatever lines we may be specializing—I think that all gas men, as this season of the year is reached, breathe a sigh of relief, not so much that spring has come, with all that that implies, but rather that the period of winter stress has been passed. And winter is a period of real stress in our business. It works its hardships upon our manufacturing men and our distribution men alike. Its influences are felt in our commercial departments. But in a more serious way than all of these, it emphasizes the chief obstacle that, in the strictly human sense, stands between the public and ourselves, for it is through this winter period that the really insignificant hazard attending the use of gas is made to appear in such aggravated form. With the first cold weather of the season there emerge from their hiding places a host of heating appliances of the portable type, ranging from the safe to the altogether unfit. Unskilled hands drag forth and fix flexible tubing, some of it of the sort that ought to make its seller subject to arrest in the first instance. And then the newspapers of the country commence to record the inevitable.

Winter is a period of restricted ventilation. Low temperatures and inclement weather mean closed windows and shut doors. This may be of little significance where appliances are flue connected or the design and regulation of the appliances are such that the products of combustion are harmless, but the possibilities under other conditions need not be enlarged upon by me. In the record of vital statistics the toll of life in

our industry is actually very small, but, in the very nature of our business and under the great white light that shines upon the work of all public servants, one fatality looms large upon the printed page. And so I say that the hazard in our business, small as it is, nevertheless stands out as one of the great obstacles in our human relation to the public. We believe that a signal contribution to the correction of this condition has been made by our Commission on Resuscitation. From the humanitarian standpoint it marks a wonderful step forward. But we believe, too, that there is still much that must be done in the elimination of causes, and we feel that this should come from within the industry and not be brought about by pressure from without. And so as we near the successful completion of the task undertaken by our Commission on Resuscitation, we feel that another task worthy of our highest effort awaits us in the attempt to abolish, so far as our skill may permit, the causes of asphyxiation. As a foreword to that undertaking we urge the closest observance of safety measures in every department of our business. We urge the broadest attitude on the much discussed question of flue connecting appliances, the limiting of the use of flexible tubing to approved standard types when supplying appliances of small consumption, and even then only where rigid iron connections will not serve. The feeling grows, that it is not enough to say, in its relation to the public, ours is as safe as any essential industry—we believe that it can be made less hazardous than any.

Several years ago we started to talk of a new unit of gas measurement—not the therm that our English friends had devised—but something to more definitely express the work value of gas in its common, everyday use. We measure our product by volume and express its cost or value in terms of so much per thousand cubic feet. But, under present day tendencies, that form of expression is of diminishing significance and the time is not far distant when there will be evolved a unit that will stand for something definite in respect to its actual value to the purchaser. The cubic foot contains, in one state, so many units of energy, and in another state, an altogether different number, so that what was in other days a fairly uniform expression of value now lacks the real significance that should attach to the unit by which gas is measured and sold. The B. t. u. means something, to be sure, but to a very great extent the meaning of those cryptic letters is unknown outside of the gas industry itself. Ultimately I believe we shall come to a unit of measurement that will tell the purchaser what he is buying. It may consist of the number of B. t. u.'s necessary to do a common piece of household work, or the amount of heat required in the performance of a common cooking operation and that being fixed upon as the general unit will take definite place in the public mind. It will be called a suitable name, one to be easily understood and one which should have a human, popular appeal.

The American Gas Association is a democratic institution. I think any one who carefully studies its Constitution and its By-Laws will agree with this statement, for the policies of the organization as well as its activities are largely shaped by its members of the individual class. Among the industrial gas men of the country there has been a growing belief that in our existing scheme of organization, in which our Commercial

Section has covered a very broad and comprehensive field, the important subject of industrial gas and its development received less attention and perhaps less action than it was entitled to. So the industrial men have taken the initiative in bringing about the creation of a separate industrial gas section—a privilege that is accorded under the Constitution and By-Laws to any group of our members under certain elastic conditions. I believe there will be few who will not find in this movement a gratifying sign for there cannot be many who will not concede that, in the development of our industrial possibilities, lies the greatest promise for the expansion of our business. And so I am particularly glad to be able to announce to you that, within a reasonably short time, we will see an Industrial Gas Section in active operation.

Although we endeavor to keep our membership and our affiliated societies informed as to the Association's policy in all things, where a policy exists, there are some on which it may not be amiss to reiterate and emphasize. We may be said at least to have made a start in striking off the bonds of conservatism that have held us too long to unscientific rate principles. In 1921 the Association announced through its Executive Board that it favored the principles of the readiness-to-serve charge and advocated that form which embraces both the customer charge and the demand charge and with the presentation of the report of its Committee on Rate Structure in 1922 it said:

"The opinion of the Committee is opposed to horizontal reductions of rates, but favors the retention of prevailing base or maximum rates by member companies, and the introduction of systems of differentials, such as block rates, or two rate schedules, or two or three part schedules, as a means of rate revision, accompanied by service charges and minimum charges at least as temporary measures."

We earnestly hope and it is our intention to bring about so far as we can, recognition of the fact that the continued development of our business is largely dependent upon the introduction of scientific and equitable rates, equitable alike to the consumer and to the company and equitable as applied to different classes of consumers. Too frequently we find a readiness to sacrifice rate principles for expediency's sake and wherever this is done it injures the cause of scientific rates. Flat rates and large volume business are not logical companions—they cannot go hand in hand. On this point I want to add the word of the former Chairman of the Wisconsin Commission, the Hon. Carl D. Jackson, who is now, as you probably know, Consulting Counsel to the American Gas Association and the National Electric Light Association, and who, at my request, has prepared this message for you:

"Gradually, all those connected with public utility operation or regulation have come to understand that if the utility is to properly perform its functions in the future and render the full service rightfully expected of it that that service must be rendered on terms and upon rate schedules that will reflect for all classes of consumers and fairly for the individual consumer their equitable share of the cost of the performance of service. It is only under these circumstances that the utility can develop along sound lines and measure up to its possibilities for public good.

"Difficult as it may be in many instances to depart from old forms of rate

schedules which have come down to us from decades long past and from conditions no longer existing, these facts alone should not deter the putting into effect practices necessary for the full performance of public service on a sound and encouraging basis. Here and there some public opposition has arisen to scientifically constructed rates, and in some instances the utility itself has shown a disposition to sacrifice proper and scientifically constructed rates rather than to take its part in demonstrating to the public the necessity and the propriety of these rates and showing to the consumer how they must ultimately redound to his own advantage. The putting off to another day of the solution of these problems as a matter of expediency is in effect the dodging of an issue which must be met and one which should be squarely met whenever it arises.

"Least of all should the utility manager or operator who has succeeded, in part at least, in approaching a fair and scientifically constructed rate schedule acquiesce as a matter of local expediency in a reactionary movement. In the long run his own company cannot gain and the industry as a whole may suffer from any such individual backsliding tendency. In one sense an individual utility may feel that its responsibilities are confined solely to itself. This is a narrow view. Every public utility is part of a great industrial and economic movement and should feel willing to do its part for the general public benefit."

I must resist the temptation to say more than a word about our sectional activities. They are all important, but too numerous and too varied for me to go into now. It would interest you, however, to learn that since our Atlantic City Convention, Illinois, and Tennessee have joined the ranks of the states which have adopted the Uniform Classification of Accounts and it is now under consideration in Colorado, Maine, Pennsylvania, Vermont, Washington, and the District of Columbia.

The work of our Insurance Committee has been attended by the most practicable of all results, a dollars and cents saving in premiums realized by gas companies that have secured new ratings under the new fire insurance schedule. Along similar lines the rates for liability insurance are under consideration.

The development of public relations work in line with the efforts of our Publicity and Advertising Section and the Sales Stimulation work of the Commercial Section are among the activities which can be measured in terms of definite results. Here again I will not enlarge because we believe our membership, as well as our affiliated societies, are kept fully informed of these activities.

Lower production costs and reduction of distribution investment have first consideration in the program of our Technical Section. Manufacturing economies are being studied, together with the development of an adequate market for residual products and research into the relative merits of carbonization materials.

While the sectional and general activities are many, there continues to prevail and I hope there always will prevail the policy that the Association's first President ably expressed when he said: "The Association is not to be judged by the multitude and variety of things that it does, but rather by the quality of its contributions to the advancement of the industry."

It is almost inevitable in talking about Association work to linger upon activities where cooperation plays a prominent part. The subject of standard gas appliance specifications is not a new one nor have there been any particularly important developments recently with re-

gard to the Association's Standard Gas Appliance Specifications. They have been officially adopted in their present form and are being very generally supported. They are beneficial to the gas industry, the manufacturer and the public alike. There can be no argument on that. Their sole excuse is the hope that the gas appliance business will come to rest upon the basis of quality merchandise and that, in the course of time, unfit and inferior appliances will have been eliminated from our business. But this can be looked for only when the gas companies of this country universally support the principle of quality merchandise and uniformly support the standard specifications. We know that most manufacturers of appliances favor quality goods; we know that by far the greater number of gas companies prefer quality appliances, but we know, too, that some companies have not fully realized the importance of quality in gas appliance manufacture. Although this is no new message it is one that deserves repetition. Of our relations with our affiliated societies I want to say a word more in closing. Fifteen such associations are now officially affiliated with the American Gas Association. We think that this year marks a closer coordination of parallel activities than ever. We feel, too, that our related work can be conducted still more effectively and plans to that end are in the making. I think the Association's policy in this regard is understood by all. It is to help in every possible way that it can. In matters of purely state or sectional interest the A. G. A. supports its affiliated organizations to the fullest extent of its power, but only through the medium of its affiliated associations, avoiding, unless asked to do otherwise, independent or separate action or any activity that may prove in the least conflicting. In matters of national activity the A. G. A. calls for the support and the assistance of its affiliated organizations and it is a great pleasure to be able to say that that support is always promptly and effectually furnished.

At the time of its organization the Constitution of the A. G. A. made provision for the establishment of geographic divisions. We have felt no need for taking the initiative because the effective, reciprocal relations that have been developed between the national body and its affiliated organizations have made such action seem to us unnecessary. But more recently the Eastern States Gas Conference has asked that it be established as a geographic division of our Association. In no sense duplicating nor conflicting with the work of the Pennsylvania Gas Association and the New Jersey Gas Association, both of which are affiliated with the A. G. A. and which will continue to maintain their separate identities and carry on their valuable activities in their respective states, the Conference plan seems to provide for another class of helpful activity which we feel will be of decided benefit and value to the gas industry in that locality to which its activities will extend. And so with the establishment of the first geographic division of the American Gas Association, as such, I want to pledge on behalf of the American Gas Association its fullest support at all times to the new division and on behalf of the officers and the Executive Board of the American Gas Association to extend to it and to its officers and members our heartiest good wishes, our pledge of support and helpfulness to the fullest extent within our power. Time may see the establishment of other geographic divisions of the American Gas Association, but the Eastern States Gas Conference will have been the first.

Announcement of Summer Course in the Manufacture and Distribution of Illuminating Gas

Columbia University, New York, N. Y.

SUMMER Session, 1923, July 9 to August 17, inclusive. Five lectures a week. Laboratory, four afternoons a week. Plant inspection one afternoon a week.

In the lectures there is first a discussion of the raw materials available for making gas. This is followed by a detailed discussion of the coal and water gas processes, including purification of the gas and recovery of the by-products. Throughout, special emphasis is placed upon the fundamental chemistry of the processes. Attention is then given to various proposed schemes for making mixed gases, and for complete gasification. In all of the study the influence of legal standards and of market for by-products on the choice of process is kept in view. To furnish a motive for the work, the class is given the problem of laying out a gas plant for a small city. Data on expected consumption, gas standards, and markets for by-products are collected. The individual members of the class then choose the kind of plant, make flow-sheets, lay out apparatus, collect construction and operation cost data, and attempt to figure the cost of gas in the holder.

In the laboratory, the chemical examination of coal, gas, gas oil and gas house products is studied. The aim of the laboratory work is to give a thorough understanding of the principles of testing these materials rather than to develop skill in the actual testing of them.

To aid the members of the class in getting first-hand information on present practice in gas manufacture, six plant inspections and several special illustrated lectures are arranged.

The plant inspections include horizontal, inclined and vertical coal gas retorts, Williamson and U. G. I. water gas sets, and Koppers coke ovens. The special illustrated lectures will be by men who are prominent in the gas industry.

This course is open to all who have had training in general chemistry, or who have had experience in the gas industry. The fees for the course are:

University fee	$ 6.00
Lectures and Plant Inspection, 3 points	24.00
Laboratory, 3 points	24.00
Laboratory deposit, returnable less breakage	15.00

For further information address Director of the Summer Session, or Department of Chemical Engineering, Columbia University, New York City.

For complete Summer Session Announcement, address the Secretary of Columbia University, New York City.

"The Executive Board at its meeting in Chicago, on March 16, adopted the following resolution:

That the Classification of Accounts for Gas Companies, as promulgated by the National Association of Railway and Utilities Commissioners and revised at the November, 1922, convention of that Association, be and is hereby made the official classification of the American Gas Association."

Know Your Association

WE WERE greatly relieved the other day to read that President Harding, acknowledged to be a successful newspaper editor and publisher, had been called "the poorest advertiser in the United States" by a member of his official family, Secretary of Labor Davis. We have been fearful of late that the appellation might with some justice have been tacked onto ourselves, for we have a guilty feeling that the Association's work and its services have not been sufficiently advertised to our membership.

It is no easy assignment to dissect all at one time a national organization like the A. G. A. and reveal its internal workings. The only way to assimilate it is to take it in small doses. With this thought in mind, we have prepared the tabulation below. It shows the various pieces of literature that have been issued from January first to April first by the headquarters organization. You will note that this list does not include the monthly magazine, reports of committees, minutes of committee meetings and various other mailings which are supplemental.

From its inception, the Association has endeavored to restrict the quantity of its mailings to a minimum, believing that quality and not quantity was one of the determining factors of real Association service. Were our policy to be otherwise, our members would be flooded with material, much of it of questionable value.

Jan. 4. Article describing 100 years' growth of the gas industry; to directors of committees on public utility information, editors of gas trade papers and editors of gas company publications.

Jan. 15. Article forcasting gas sales for 1923; to editors of all financial newspapers in U. S., all financial houses handling public utility securities, all statistical organizations, gas trade papers and directors of committees on public utility information.

Jan. 15. Booklet, "Survey of Laboratories in U. S.," to gas company members.

Jan. 16. Booklet, "Guiding Principles of Public Service Regulation"; to gas company members.

Jan. 20. A. G. A. Advertising Copy Service; to 220 gas company subscribers.

Jan. 22. Twelve copies of Congressional Record containing article on tax-exempt securities by Prof. R. A. Seligman; to directors of committees on public utility information.

Jan. 26. Pamphlet, "Shall State Regulation of Public Utilities be Abandoned"; to directors of committees on public utility information.

Jan. 30. Bulletin; Sales Stimulation Committee, Commercial Section; to gas company and manufacturer company members.

Jan. 31. Booklet, "Uniform Classification of Accounts for Gas Utilities," to gas company members and managing committee, Accounting Section.

Jan. 31. 3 Booklets. Work of Washington Office, Joint Fuel Committee Presentation of Joint Fuel Committee to U. S. Coal Commission, Presentation of A. G. A. to U. S. Coal Commission; to gas company members, affiliated state associations, public service commissions and directors of committees on public utility information.

Feb. 1. Excerpts of address by Gov. Warren T. McCray, of Indiana; to directors of committees on public utility information.

Feb. 2. Information Service Letter No. 40; Kansas Public Utilities Commission Upholds the Three Part Rate; to all members of the Association.

Feb. 3. Address by Carl D. Jackson "Home Rule vs. State Regulation"; to gas trade papers and directors of committees on public utility information.

Feb. 3. Resolutions of Chamber of Commerce of New York on state regulation; to affiliated state associations and directors of committees on public utility information.

Feb. 19. Copies of seven gas company advertisements; to directors of committees on public utility information.

Feb. 20. A. G. A. Advertising Copy Service; to 220 gas company subscribers.

Feb. 23. Interim Report, Investment Bankers Association of America; to gas company members.

Feb. 27. Merchants Association of N. Y., Report of Committee on Public Utilities and Law; to directors of committees on public utility information.

Feb. 28. Five Mimeographed pamphlets "Heating Value Requirements." "Pressure Requirements," "Meter Regulations," "Purity and Chemical Requirements" and "Main Extensions," compiled by Committee on Gas Standards; to engineers of 25 state commissions.

Mar. 15. Information Service Letter No. 41, U. S. District Court Decision in case of Citizens Gas Company of Indianapolis; to all members of the Association.

Mar. 19. Bulletin, Sales Stimulation Committee, Commercial Section; to gas company and manufacturer company members.

Mar. 25. A. G. A. Advertising Copy Service; to 220 gas company subscribers.

Mar. 27. Article on gas meter; to directors of committees on public utility information.

Mar. 27. Three-page letter explaining A. G. A. Standard Specifications; to directors of committees on public utility information.

Mar. 28. Article on use of gas for industrial purposes; to directors of committees on public utility information.

Mar. 28. Pamphlet, "State Regulation vs. Municipal Control," describing New York State situation; to directors of committees on public utility information.

A. G. A. Standard Specifications

At the March meeting of the Executive Board, the following resolution was presented on behalf of the Commercial Section and was unanimously approved by the Board—

Whereas, the Managing Committee of the Commercial Section believes that gas appliances should be quality goods, constructed with first regard to safety, efficiency and durability in order that they may render the best possible service and satisfaction to their users, and

Whereas, the standard appliance specifications of the American Gas Association provide for these essential features in gas appliances,

Resolved, that the members of this Managing Committee hereby agree to recommend for purchase and resale only those appliances constructed in accordance with standard specifications so far as they exist or may be later adopted and marked by tag, badge, or imprint of such kind as the manufacturers may prefer, with the words "Constructed in strict compliance with the standard specifications of the American Gas Association" and that they earnestly recommend similar action by all members of the Commercial Section of the American Gas Association, and further, they recommend that this resolution be approved by the Executive Board and by its order transmitted to the gas appliance manufacturer members of the Association.

ACCOUNTING SECTION

J. W. HEINS, Chairman — W. A. SAUER, Vice-Chairman

H. W. HARTMAN, Secretary

MANAGING COMMITTEE—1923

At Large

BARKER, W. S., Newark, N. J.
BISSELL, J. H., Boston, Mass.
BRINE, F. A., Atlanta, Ga.
CASSELL, W. H., Baltimore, Md.
DAVIDSON, H. C., New York, N. Y.
DOERING, W. A., Boston, Mass.
FENNIMAN, J. R., New York, N. Y.
HALL, I. S., Boston, Mass.
HOFFMAN, F. C., St. Paul, Minn
JEFFREY, Jos., Scranton, Pa.
LAWALL, H. J., Philadelphia, Pa.
LAWRENCE, JAMES, New York, N. Y.
LYNCH, B. W., Chicago, Ill.
MEYERS, W. J., New York, N. Y.
MURFIT, W. G., Newton, Pa.
PATTERSON, F. H., Rochester, N. Y.
POTTER, O. F., Newark, N. J.
RASTENBURG, F. G., Indianapolis, Ind.
REESE, J. G., Baltimore, Md.
SCHMIDT, JR., WM., Baltimore, Md.
SCOTT, J. M., Wilmington, Del.
SHORT, A. F., Providence, R. I.
TOSSELL, A. L., Chicago, Ill.
WINTERS, A. C., Chicago, Ill.

Representing Affiliated Societies

ARMSTRONG, J. J., Toronto, Can. (Canadian)
CLINTON, DEWITT, Worcester, Mass. (N. E. Gas Eng.)
DEAL, E. C., Springfield, Mo. (Missouri)
GOODNOW, A. C., Jacksonville, Fla. (Southern)
HAASE, EWALD, Milwaukee, Wis. (Wisconsin)
HODGES, E. W., San Francisco, Cal. (Pacific Coast)
JAMES, F. M., Aurora, Ill. (Illinois)
KURTZ, ADAM, Detroit, Mich. (Michigan)
MCCABE, J. B., Dallas, Texas (South Central)
PETTES, W. H., Newark, N. J. (New Jersey)
PHILLIPS, R. E., Lincoln, Neb. (Iowa)
PORTER, EDWARD, Philadelphia, Pa. (Pennsylvania)
SCOBELL, E. C., Rochester, N. Y. (Empire State G. & E.)
SHEARON, B. P., Hammond, Ind. (Indiana)
WILBUR, A. A., Brockton, Mass. (Gas Sales of N. E.)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Budget—F. H. PATTERSON, Rochester, N. Y.
Customers Accounting—W. A. DOERING, Boston, Mass.
Fixed Capital Records—H. J. LAWALL, Philadelphia, Pa.
Insurance—J. G. REESE, Baltimore, Md.
Nominating—EWALD HAASE, Milwaukee, Wis.
Relations with Customers—A. L. TOSSELL, Chicago, Ill.
State Representatives and Contributions to Monthly—JAMES LAWRENCE, New York, N. Y.
Uniform Classification of Accounts—W. J. MEYERS, New York, N. Y.

Accounts Payable and Purchases

R. S. HOLDEN, Assistant Director, Bureau of Commercial Economics, Chicago, Ill.

USUALLY we think of the accounts payable division of an accounting department in its relation to the general books of the company or in its significance to the treasurer's records, and we see without much difficulty that the chief reason for its existence rests in the safeguards with which it surrounds expenditure. It is maintained to insure against fraud and negligence and to be an independent agency for making every would-be expenditure prove itself before it may be admitted to the treasury department where, if cash funds are available, it becomes an actual expenditure.

If the accounts payable division were to lessen this main responsibility in order to give greater attention to a thing that was only secondary, large losses might be the result.

Similarly, we think of the purchasing department and of the routines, the forms, the files, the personnel, and of all the other things that give the office of that department life and effectiveness, in its relation to its most important function, namely, that of buying at the right time the right quantity of the required material for the least money. Not in every case can even the most efficient

purchasing agent expect to accomplish this, but the extent to which he can consistently approximate such a desirable result will determine the excellence of his ability.

If the purchasing department, maintained as it is primarily to produce this benefit, were to sidetrack its principal purpose in order to give their chief consideration to a thing equally important from the viewpoint of another department, but in fact merely incidental in its bearing on the purchasing department, loss of money—perhaps large sums of money—would ensue.

The purchasing department does not exist for the purpose that invoices may be supplied to the accounting department, nor does the accounting department function solely in order that invoices may be vouchered.

The attempt here is to mention the purchasing department with its relation to accounts payable, and likewise to mention the accounts payable division of the accounting department with its relation to the purchasing, while at the same time explaining some of the principal routines by which work is done in each department.

Accounts Payable

Perhaps no other term in accounting terminology is more easily understood than is "Accounts Payable." It is practically self-explanatory. It includes all debts due on open account—in corporation accounting practice, usually debts covering which audited vouchers have been made. In a general way, the term includes accrued interest, accrued taxes, and other accrued expense, but actually these are segregated within a group carried to the balance sheet under the heading, "Accrued Liabilities." In the general ledger also, they are kept separate from the account, "Accounts Payable." This account, of course, does not include obligations evidenced by notes, bonds, and acceptances, each of which is in itself accounted for according to its special nature; security and priority of payment being of particular significance.

For the sake of clarity, the subject of accounts payable will be considered in this discussion only in conjunction with the voucher system. Everybody ought to use the voucher system where it is adaptable. It is nothing short of criminal negligence for a business other than a very small one to be so conducted that a check may be drawn on the cash in bank other than from a voucher that has been audited and certified. Complaint sometimes is made that the preparation and approval of the voucher takes time and therefore delays the drawing of the check. A complaint of this kind is a complaint against providing reasonable security for the most important asset of a business, namely, the cash on hand, and is never expressed by anybody understanding why the keeping of accounts is necessary.

One authority on accounting, speaking of the advantages of the voucher system, says that one of them is the "great saving in labor, since there is no posting to individual accounts." In that statement there is presupposed the elimination of the creditor's, or accounts payable, ledger where the voucher system is established. This, however, is not always the case. A creditor's ledger is sometimes maintained in addition to the records and routines involved in a voucher system. Except for those individual accounts on which payments usually are made in installments, or "on account," the extra work involved in

keeping the creditor's ledger is not justified by the results produced.

The Voucher

In its simplest elements, the voucher is merely a formal statement bearing the names of the creditor and the debtor, the amount due, a brief description of what the amount represents, and the certifications and approvals of designated persons qualified to sign their names in their respective capacities. It serves to authorize the treasurer to draw a check, a negotiable instrument, on the company's funds and in favor of the creditor who thereupon becomes the payee. It is essentially an instrument of the accounting department where it either is made or is sent for completion, is registered, and its duplicate filed—in other words, controlled.

The Voucher Check

Quite rapidly, so rapidly in fact that it is approaching universal use, the voucher check is supplanting the old-time voucher without eliminating any of its valuable functions. With the use of the voucher check, the privileges and the responsibilities of the accounting department are not changed with relation to the authorization of the disbursement, and the voucher in voucher-check form reaches the treasurer, just as formerly, as a non-negotiable piece of paper but still a formal document of authority for paying out a certain amount of the company's cash. The treasurer, however, finds in the voucher check not only a voucher, but a check on which most of the clerical and typing work has been done and which to be complete and negotiable need only receive a check number, a date, the treasurer's signature, and a counter-signature.

The voucher check is made in two portions, sometimes separated by a perforation. One section ultimately becomes the check and is so made up that it looks like a check. On it are written the voucher number and date, the creditor's name and address, and the amount due. The creditor's name and address frequently are written in a space specially provided that the check may be mailed in a "window" envelope.

The other section shows briefly a description of what the voucher is for.

On the back of the check above the space for indorsement is printed a statement which, when signed by the indorsee, binds him as having given a receipt for the specific payment described in the voucher.

The old form of voucher makes necessary the writing twice of the creditor's name and address, once on the voucher and once on the check, and if the "window" envelope is not used, the creditor's name is written three times, once on the voucher, once on the check, and once on the envelope in which the check is mailed. Obviously the use of the voucher check saves time, for with its use the creditor's name and address need be written but once.

That there can be so many forms of voucher checks in use is difficult to comprehend. The many different kinds are due somewhat to the small (and occasionally large) pecularities of a particular business, and somewhat to the whims of the people in the accounting and the treasury departments. One of the chief benefits to be derived in the design of a voucher check usually is over-looked: If it is worth while—and it is worth while—to use the voucher check instead of the old form of voucher merely to save one writing of the creditor's

name and address, then it is also worth while to save one insertion in the typewriter. This can be done merely by printing the duplicate voucher check on paper slightly longer than that used for the original and at the bottom on that portion of the duplicate thus exposed to place the headings for the distribution to the accounts affected. By this means the voucher check travels straight through the typewriter and comes out complete; it does not have to be turned over or put back in the typewriter. Moreover, all the information is on the face of the original and duplicate voucher check, and this facilitates the checking by the voucher clerks.

The Voucher Register

Even the best drawn voucher register may be largely regarded as a columnar sheet, but a poorly drawn one really is nothing more; yet the voucher register may well be something better than paper with columns on it. If it has headings that are reasonably self-explanatory; if the debit portion is boxed off from the credit portion in such a way that whoever works on it may thereby realize more fully the bookkeeping significance of this record; if columns are allotted only to accounts having numerous entries; if the space at the extreme right for miscellaneous accounts is made to serve its intended purpose; if the form is printed on both sides of the paper; if the form is not so large as to be unwieldly, though this involves the use of inter-leaves; and if the register is in all other respects maintained with the realization that it is an accounting record of original entry no less important than the general ledger itself, it becomes perhaps more what we might expect it to be, not just a handy sheet for recapitulating vouchers.

Some accountants put the cash discount column in the check register, others in the voucher register. If the treasurer cannot tell ten days ahead whether he may make a payment in time to save the cash discount, then provision must be made in the check register for recording the discount. In effect, the treasurer therefore draws a check for an amount different from the amount authorized, namely, the amount on the voucher, because when the voucher was made the cash discount was not deducted as it was not known whether it would be taken.

Wherever possible, and usually it would seem possible, if a cash discount column is provided in the voucher register, the cash discount (this does not become a cash disbursement) may be segregated at the source and kept out of "Accounts Payable." The balance in "Accounts Payable" in the general ledger then represents the amount actually owing, not the amount actually owing plus the cash discount.

With the cash discount deducted on the voucher, the treasurer may draw his check for the exact amount which the voucher shows without making any change in it. He will not be obliged to enter in the check register an item which is not cash, but discount, and which has to do with the accounting for disbursements, for which purpose the voucher register is available.

The Passing of the Invoice Covering Purchases

The part which the purchasing department plays in the passing of the invoice for material furnished will be mentioned under the general heading of "Purchases." Let us assume that the invoice through the regular channel, say, the stores department, has reached the ac-

counting department and is presumably ready to be checked.

The voucher clerk first sees that a certification is attached showing that the goods have been received. This certification usually is on a separate form, the receiving ticket, and the signature on it in every instance if the auditing is looked after properly is that of the person actually receiving and counting the goods, not the signature of his superior or of his superior's superior. The opinion is ventured that this is the most important element in the auditing of the invoice and the auditor is entitled to take nobody else's word for the receipt of the goods unless he also has the word of the person who actually did the counting.

The price and terms (the trade discounts, the cash discount, the F.O.B. point, special agreements as to transportation charges, etc.) are approved before the invoice reaches the accounting department, and upon the basis of the price and terms thus approved, the voucher clerk makes the computations and gives the scrutiny that results in determining whether or not the invoice is what is commonly called clerically correct. If the invoice is found to be correct the distribution is then applied, or if already applied, it is checked and the invoice is ready for vouchering.

Purchases

The general function of the purchasing department is to purchase economically and expeditiously the material, equipment, supplies, and merchandise for the company of which it is a part. The department is maintained and is essential only for the purpose of furnishing accurately and without loss of time the means whereby this function may be best realized.

The more important specific functions of the purchasing department may be named as follows:

1. To receive approved purchase requisitions from other departments of the company.
2. To be familiar with prices and markets for material, equipment, supplies, and merchandise.
3. To receive salesmen and other representatives of vendors, and to conduct all negotiations in regard to purchasing.
4. To ask and receive quotations for all items that are to be purchased.
5. To place all purchase orders as authorized by approved purchase requisitions.
6. To follow all orders placed, and secure prompt and adequate deliveries.
7. To receive test reports on the quality of materials and supplies received.
8. To approve all invoices for terms, prices, and quantities ordered.
9. To maintain proper purchase records and files.

Lack of space precludes mention of the purchasing department in relation to all the details that have to do with these functions, and besides it is our purpose to give chief attention to the activities of the purchasing agent's office. These activities pertain largely to three main subjects, namely, the purchase requisition, the purchase order, and the vendor's invoice. Supplementary routines exist. They are tracing, filing, record keeping, report making, etc.

Whether or not the purchasing department produces the results expected of it and thereby properly performs the general function for which it exists, depends to no small extent on the manner in which the office is run.

The Purchase Requisition

The maker of a purchase requisition gives the purchasing department the best

opportunity to do its work well when he gives as much advance notice as possible. If he does not anticipate his needs for material and waits until the last moment to fill out his purchase requisition, he cannot expect the purchasing agent either to give him good service or to do justice to the company in obtaining the best prices and terms.

It is the maker of the purchase requisition who originates the "account payable," and who starts the transaction of many routines that finds its way through the purchasing, the accounting, and the treasury departments to the cash funds at the bank. If the account payable carries an overcharge in the nature of a premium on inefficient ordering at the source, namely, the person who sent the requisition to the purchasing department, the company suffers a loss. Are we usually giving the man at the source enough of an opportunity to realize that the only difference between a purchase requisition and a check on the bank is that while the latter is immediately negotiable the former, in effect, probably will be eventually.

In order to assist the purchasing agent of a company of average size or larger, the purchase requisition may be made in triplicate, the original going to the department head and others outside the purchasing department for approval and the duplicate going direct to the purchasing department. The triplicate, of course, is the maker's copy.

By this arrangement, the purchasing department is enabled to proceed at once to request bids, to bargain, and otherwise to prepare for the purchase, but in no event to conclude the purchase until the original purchase requisition, duly approved, is received. When the original purchase requisition is so received, the purchasing department is either ready or almost ready to place the purchase order with the vendor, and consequently much time is saved.

If the original purchase requisition is turned down, the purchasing department simply makes no use of the information which it has obtained. The fact that this system works out well in practice would indicate that comparatively few purchase requisitions fail to receive approval at least in part.

The Purchase Order

The variation in the forms of the purchase order is not exceeded even by the variation in the forms of the voucher check. Some companies require many copies, others require few copies. Where a large number of copies is needed, the hectograph duplicator may be used to advantage in making the copies desired from the impression of the original order. The original order is written singly on the typewriter with the use of a copying ribbon. If a smaller number of copies will suffice, the purchase order may be printed in fan-fold arrangement and written by the typist with increased rapidity through the fact that she need not insert carbon paper.

The purchase order may well be designed carefully as to its appearance, it is a good advertising medium, for many people see it. It will contain the usual legal phraseology, will call attention to the purchase order number especially as to the importance of showing that number on all packages and communications, and will provide room in self explanatory columns for recording clearly and concisely the quantity, the description, the price, and the terms.

Usually it is feasible to print the purchase order on paper 8½ by 7 inches

in size and to design it in such a way that the name and address of the vendor are written on a part of the order permitting the use of a "window" envelope in mailing. A form of this size has the advantage of requiring only one folding for insertion in the envelope.

The Vendor's Invoice

The main effort of the purchasing department has been expended by the time the invoice is received. It is only natural, therefore, that a tendency to be too lax in handling the invoice should prevail.

If the purchasing agent has done the purchasing to the best of his ability, his principal concern in the invoice is that the vendor have no complaint about receiving the payment of it. His concern is not one, however, that causes him to act until after the vendor has acted. There was a time when the vendor traced the payment of his invoices through the purchasing agent, but that practice is rightfully, now largely obsolete; the accounts payable division of the accounting department is better equipped to supply the vendor with the information he requests.

The purchasing department, however, is not for that reason relieved of important responsibility relating to the invoice. The chief duties in the handling of it follow:

1. The invoices are first sorted into two groups, namely, cash discount and net invoices.
2. The cash discount group receives not only first attention as to complete checking but special attention as to checking the cash discounts.
3. Each kind of invoice is stamped respectively with a cash discount or a net stamp.
4. The cash discount invoice is sorted into its numerical order by purchase order numbers, and is checked against the purchase order as to number, name of vendor, quantity and description of each item, price, discount, F.O.B. point and terms.
5. The date and amount of the invoice is entered on the purchase order.
6. After checking the invoice, the invoice clerk places the impression of a certification stamp thereon and writes his initials below it. In some companies, where the account number is shown on the purchase order, he copies the account number on the invoice.
7. A register in duplicate is made of the invoices checked. The register together with the invoices is then sent to the stores department or other departments receiving the material. The cash discount invoices are registered first and are otherwise given preference in order that they may be hurried to the accounts payable division. This gives the accounts payable division more time in which to prepare the vouchers and to take advantage of the cash discounts.

If the invoice were received on time from the vendor, if it contained no error, if the invoice clerk in the purchasing department did his work accurately and without delay, and if the stores department acted promptly, the invoice would find its way to the accounts payable division with monotonous regularity.

But these perfectly reasonable things do not happen as often as we would expect. Why a vendor is not more concerned in receiving prompt payment for his goods than to delay sending in his invoice is a question perhaps for him to puzzle over, but in the aggregate he falls down often enough in this respect to cause the purchasing department much extra work and everybody concerned much confusion. Occasional errors in the invoice will be made, of course, and the invoice clerk must give the incorrect invoice special handling, thereby con-

suming time and causing unavoidable delay.

Because of these reasons, the purchasing department maintains a tracing department partially for the purpose of obtaining the invoice. This tracing may be done more or less automatically if the right method is used. Regardless of the method used, however, carelessness on the part of the invoice clerk or a change in clerks may so upset this routine as to cause much confusion in all departments interested. A purchasing department in which a capable chief clerk has supervision of the office will give much better results in all respects, but in this respect particularly, and it is only fair to mention here that a good chief clerk contributes immeasurably to the smooth running of the purchasing department.

The Receiving Ticket

When the invoice reaches the accounts payable division of the accounting department, a receiving ticket should be found attached to it. Much time is saved in the checking if the receiving ticket is so made out that its identity with the invoice is readily seen.

A plan that works out satisfactorily in most cases is to make one copy of the purchase order serve as the receiving ticket. As soon as the order is written, the receiving-ticket copy is sent to the person who receives the goods. This receiving ticket, being a carbon copy of the purchase order, furnishes the information needed in receiving the goods intelligently, and when signed by the receiving clerk and forwarded with the invoice to the accounting department, furnishes also the means of accurate and rapid checking.

If the material on a purchase order is received at various times, it then becomes necessary to make as many receiving tickets as there are shipments. Usually in such a case a separate form is filled out for each shipment except the last; for the last shipment the receiving ticket, which is a copy of the purchase order, is used and the quantities thereon changed to correspond with the quantities received.

Objection is sometimes raised to the use of a carbon copy of the purchase order as a receiving ticket on the assumption that it furnishes the receiving clerk with too much information, and as a result he signs the receiving slip in a perfunctory manner without making a careful count of the goods. Such objection has much theoretical merit, the thought being that if the receiving clerk does not know what has been ordered, he makes an independent and therefore a more reliable count of the material received.

Actually, however, the receiving clerk is handicapped in the proper performance of his duty when such information is withheld from him. He checks the material with more intelligence, naturally, if he knows what the purchase order stipulates, also he turns in a receiving ticket that can be interpreted without resort to special investigation with its resulting loss of time.

The Reciprocal Obligation

No manufacturer or merchant is impressed favorably with the company whose accounting department is always late in vouchering invoices or unable readily to answer all reasonable inquiries regarding overdue accounts. The purchasing department shares the responsibility for such a condition if it handles invoices carelessly and fails to maintain an adequate tracing system.

No manufacturer or merchant will knowingly sell goods to a company that is unable to pay its debts. If a company has the reputation of slowness in making payments, it fails to place itself in that preferred class which rightfully enjoys special attention. Every purchasing agent appreciates the importance of having his company in this class, for it gives him an advantage in the driving of bargains when he makes purchases of material.

It will be seen that the handling of the accounts payable, therefore, is expedited by the effectiveness with which the office of the purchasing department is conducted.

It will be seen also that economical purchasing is facilitated by the efficiency with which the accounts payable are handled.

New Members

Gas Company Members

Traverse City Gas Co.,
H. F. King, Mgr.,
110 E. Front St.,
Traverse City, Michigan.

Boise Gas Light & Coke Co.,
R. C. Theis, Asst. Mgr.,
211 North 10th St.,
Boise, Idaho.

Lincoln Water & Light Co.,
E. MacDonald, Genl. Mgr.,
216-218 S. Kickapoo St.,
Lincoln, Illinois.

United Gas & Fuel Co. of Hamilton, Ltd.,
P. V. Byrnes, Pres.,
15 Main St. E.,
Hamilton, Ont., Canada.

Jersey Shore Gas Company,
S. G. Kinter, Pres.,
247 Allegheny St.,
Jersey Shore, Pa.

Stoughton Light & Fuel Co.,
A. N. Thompson, Mgr.,
111 W. Main St.,
Stoughton, Wisc.

Orange Co. Public Service Corp.,
S. D. Sprong, V. P.,
12 South St.,
Middletown, N. Y.

Manufacturer Company Members

Builders Iron Foundry,
Chas. G. Richardson, Sales Mgr.
Meter Dept.,
Providence, R. I.

Wilder Metal Company,
C. J. Burg, Sales Mgr.,
Niles, Michigan.

Old Ben Coal Corp.,
John E. Beebe, Director,
1114 McCormack Bldg.,
Chicago, Ill.

A. C. Laurence Leather Co.,
Roland N. Cummings, Sheepskin Sales Mgr.,
210 South St.,
Boston, Mass.

Leeds and Northrup Company,
C. R. Cary, Asst. Sec.,
4901 Stanton Ave.,
Philadelphia, Pa.

Franklin Sales & Burner Mfg. Co.,
H. G. Franklin, Prop.,
4208 Carthage Pike,
Cincinnati, Ohio.

New York Gas Tubing Co. Inc.,
Chas. A. Smith, V. P.,
806 Greenwich St.,
New York, N. Y.

Titeflex Metal Hose Co.,
C. W. Fletcher, Pres.,
297 Badger Ave.,
Newark, N. J.

Mr. Russell's Views on Company Taxes*

In the course of an interview recently which the Editor had with Mr. Russell, the latter spoke of the tax situation in the company and pointed out that in 1922 the astonishing amount of $871,000 was paid by the company in state, federal and local taxes. Probably few employes realize that such a large amount of money is paid every year in general taxes or are aware that the estimate of company taxes for 1923 is, roughly, one million dollars. Mr Russell, in commenting on the tax expenditure in 1922 pointed out that approximately $546,000 of the total related to the electric department and that this amount was, roughly, 50% of the total revenue from the company's eight-cent business.

When we consider that 50% of the total revenue from the eight-cent business is paid in taxes, it is also desirable to note that the average price received in 1922 for the electric current sold by the company was 2.58 cents per k.w. hour.

From the above it is obvious that if our electric department was under state or municipal control, the domestic rate could be cut from eight cents to four cents per k.w. hour and the company would still receive the same net income from this class of business. However, the tax payer would not be relieved of this difference in expense because the tax item would have to be made up out of the general taxes which would have to be raised in other ways, probably by general increased valuation or increased rate on present taxable property. The burden would further be heavier on the individual tax payer, for the amount now paid indirectly through the company's 130,000 customers, would have to be raised from among the 60,000 tax payers, assuming one tax payer to an average family of five, with a 300,000 city population.

Mr. Russell further noted that in the gas department the taxes were approximately $301,000 in 1922, which corresponds to a tax of ten cents per thousand cubic feet of gas sold.

Few understand that 10% of the company's gross earnings are paid in the form of taxes and that of the total taxes a large proportion goes to the state and federal governments, which in 1922 amounted to about $60,000 and $232,000 respectively. Taxes on non-operating properties and the steam department aggregate over $21,000.

It is a rather significant fact that the payment of taxes by the company helps to spread the general tax burden. Of course, the people in any event must pay the taxes but the taxes which the company pays are collected either directly or indirectly from all users of Rochester products into which gas and electricity have gone in the process of manufacture. Thus the world at large contributes to our local tax burden.

Mr. Russell states that taxes are one of the largest company expenditures and a clear comprehension of their importtance and magnitude is desirable that all employes may know more about the problem in conducting this large and growing business.

*Reprinted from Rochester Gas & Electric News, February, 1923.

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The Business of Making Friends

S. JINKS, Advertising and Publicity Manager, Northern Indiana Gas & Electric Company, Hammond, Indiana.

THIS IS a true story. It happened recently in a certain town, not more than two thousand miles from Chicago. The service of a certain utility (it was not the gas company) was bad, bordering on the impossible. Certain influential citizens of the city determined that something ought to be done about it, and forming a delegation, they decided to have a nice, friendly chat on the matter with the president of the utility in question. They went, they saw, but unlike Caesar they did not conquer. They were very business-like about their visit. They told the president that the service was rotten, that the progress and prosperity of the town was being retarded by the shortcomings of his company. As public-minded citizens, they felt they were entitled to know what steps were being taken to make the service acceptable to the community.

The president was most indignant. "Gentlemen," he said, or words to this effect, "what would you think of me if I came into your office and dictated to you how to run your business?" Without more ado, he ushered them from the sacred (?) chamber, and the sequel..... The gas company will cook the funeral feast, other public utilities in the town will contribute their share to the success of the obsequies, and the corpse will be lowered unhonored and unsung into a failure's grave unless that President learns some "service" sense.

Much water has passed under the bridges since the elder Vanderbilt made his famous (or infamous) remark about the public. Since then public utilities have learned much. The late O. Henry in one of his short story classics, says that no man can consider that he has fully lived if he has not experienced poverty,

war, and love in his life. Every utility has experienced the two former conditions, I feel sure, and most utilities are now realizing that the most important component of successful commercialism is lacking, unless there is the element of "love" injected into the relations existing between itself and the customer it serves.

I purposely use the word "love" as a customer ideal worth striving for. Many hard-boiled managers no doubt will smile derisively at such a thing in the public utility game. But why not? I love my pipe. It's a pal when I'm lonely; it's a help when I'm tired; and it's a solace when I'm troubled. Sure I love it, but how much more ought I to love the gas water heater down in the basement? My pipe, if you will, takes care of my creature comforts, but standing there in the kitchen is an appliance that....Yes, my gas range! Why shouldn't I love that just as ardently as my old corn cob pipe? I would if my mind were dragged away from other engrossing topics and led to think more of the blessings I owe to the gas company that serves me. Of course, I, as a gas man, am very familiar with the merits of gas service. I, for the sake of illustration, merely placed myself in the shoes of one of our customers. I often do that in other respects, for in my opinion, the ability to place one's self in the shoes of the customer is the first attribute necessary to build a finer relationship with the customer.

A greater public appreciation of our service is the object of all enlightened utility managements. Any business—public or private—acquires only one thing—Friendship. If it doesn't it pretty soon ceases to be a business, for all of us, you know, live on our friends. With the public solidly boosting for us, future financing, rates, and other problems that confront us daily, become very much easier to tackle. The best way to find out how the public can be made more friendly, is to find out why it isn't so friendly now as it might be. There are hundreds of reasons, varying with the localities in which we operate. Purely local troubles require purely local remedies. Then again there are general conditions.

Do you know that in asking the average man to be friendly inclined toward the gas company, you are asking him to renounce the inborn traditions of centuries? Ever since business ascended from the individual plane, the common conception of "big business" is that it is crooked, and the bigger it is, the more crooked it must of necessity be. That is a fact, for how else can you account for the blethering, foam-flecked demagogues who are still tolerated on this earth? The average man listens to the talk about "soulless" corporations and the rest of the clap-trap and it sounds familiarly true to him. Thus thrives demagogism. A demagogue, like the yellow newspaper, doesn't say what he thinks himself; *he says what he thinks the people think.* There is only one answer to that fellow . . . . . indisputable FACTS. Getting those facts from the company into the minds of the customers is the whole alphabet of a public utility's "public relations" efforts. By doing this, you kill the two bad birds with the one stone. The demagogue fades away, and public ignorance of our doings will be dispelled. The latter, by the way, is for the most part our own fault, being a result of those "Hush-hush" days, when affairs of state were open gossip compared with ours.

With my space limited, I can only briefly indicate here the best baits in the friendship-fishing game. They vary, of course, with the pool, and merit is, of course, solely dependent on the local conditions encountered. I am all for the "personal touch." I believe in reducing the points of contact with the public as much as possible, and then taking those points of contact, soak them in a concentrated solution of the spirit of service, polish them up with courtesy, and set them where they can function without unnecessary restraint. Facts are not facts unless they are substantiated by the organization behind them. In other words, "Service First" isn't really "Service First" if anybody from the meter reader to the president isn't working to that end.

Continuing with the "personal" idea, I'm all for "selling" the local manager to the community. If he is any sort of a public utility executive at all he's public spirited. He is active in Chamber of Commerce affairs. He is a Rotarian or a Kiwanian, or a leading figure in the welfare or civic organizations that are common to all American communities. Concentrate your publicity on him. Build up for him a reputation for honesty of purpose, efficiency, *and accessibility*. Wrapping your good-will efforts around the personality of the local manager is a splendid plan—if you have the right manager. If you haven't—well, you're out of luck.

Intelligent newspaper publicity is also necessary. There are two important factors in this—yourself and the newspaper man. It is up to you to know the difference between "news" and advertising copy. With regards to the newspaper man your big job is to make it easy for him to come to you for all facts appertaining to news involving your company. So much for the newspaper angle.

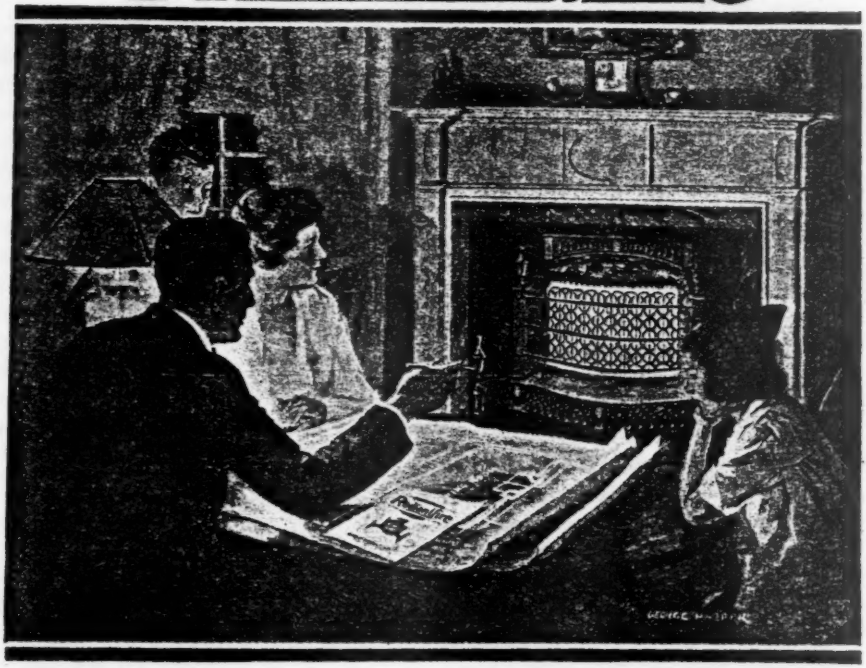
Welfare and good-will advertising are of course essential. A thousand "don'ts" could easily be written in this respect. I will confine myself to a few of the main ones. Don't be an engineer to the bewilderment of your readers. Avoid technicalities as far as possible and where they are unavoidable, drape them in the simplest layman's language possible. Take a leaf from the electrical man's notebook, and coin such simple phrases as "cross wires" etc. Be persistent. Drive ideas in one at a time, and be reconciled to completing the cycle a thousand times over if necessary. But one simply-expressed thought at a time, remember! Conduct your advertising in a business-like way. Lay out your advertising appropriation over the whole fiscal year by months, and schedule your monthly advertising to be systematically persistent.

There are many other excellent plans, some of which I do not mention here because they are somewhat local in their characteristics. The whole point is, however, that every conceivable thing that can be done to influence the customer to think better of the company ought to be done if it doesn't overstep all legitimate reasonableness. This bid for customer friendship is a bid for existence itself. We must always remember that, and appreciating *all* that it means, we should make it the best of all our efforts to serve the public as we would have the public serve us.

The HUMPHREY

Radiantfire

TRADE MARK REG. U.S. PAT. OFF.



"The New Home Won't Be Complete Without It"

In thousands of new homes this Spring there will be the bright, cheerful glow of the Humphrey Radiantfire. The story of this wonderful heating device has spread from coast to coast and every installation has created one more circle of enthusiastic friends. For, wherever there is Gas service—natural or manufactured—Radiantfire offers the quickest, cleanest and most healthful form of heating.

Then, too, there are models for every purpose—exquisite period designs for Fire Place installation or portables for any corner of a room. All pour forth their radiant heat in the same efficient way burning several hours for the cost of a single shovel of coal. In your new home—or the present one—can you afford to overlook so great a source of comfort and real economy?

The Humphrey Radiantfire is sold by your Gas Company or Dealer. Ask for it by name. There are twenty-three years of experience behind Humphrey products—and we know exactly what we are building. Insist upon our name plate—and you will know exactly what you are buying.

GENERAL GAS LIGHT COMPANY

New York, 44 W. Broadway — KALAMAZOO, MICH. — San Francisco, 768 Mission Street

PITTSBURGH — BUFFALO — CINCINNATI — ATLANTIC CITY

If it's Heat you want you can do it better with Gas—It's cleaner.

The Association's seal and an adaptation of its slogan now appears in national advertising

A New Era of Utility Publicity

RECENTLY, a director of one of the committees on public utility information published a book on the history and development of the gas industry. While he was making out his mailing list a few days later he said to a friend:

"I'm going to send one of these over to the (mentioning the local office of the largest news distributing agency in the United States). They may find time to glance through it."

The following week he dropped in the agency's office and in answer to the question "How do you like the gas booklet?", there was placed in his hands an 800-word story that had been mailed that day to 1200 of the largest daily newspapers in the United States. The author of the booklet got the jolt of his life when he read the story. It was headed: "Jeered First Maker of Gas. Discoverer called Madman for Thinking He Could Light London."

In news values, as such values are measured today in modern journalism, the story was 111 years old. It told about Winsor organizing the first gas company in 1812, mentioned Rembrandt Peale's lighting sensation in 1816 and ended with a description of the industry's progress down to 1875. But despite its hoary age, it was a new and newsy gas story, for a multitude of editors published it verbatim. And it strikingly illustrates the oft-repeated assertion that the entire utility industry in all of its various branches is, even today, a practically untapped field of news-gathering opportunities for the alert reporter.

One of these days we would like to see Floyd Parsons blossom forth in a national periodical in an article devoted to the subject of utility publicity and its remarkable advancement within recent years. The banking interests are often complimented for their quick and thorough conversion to enlightened methods of publicity, but we venture to say that the utility companies of this country have established a record second to none, —and have done so in the face of more stubborn handicaps and prejudices than any other class of business.

No one has yet attempted to describe this new era of development in the utility industry with any degree of thoroughness because the thing is so big and has so many ramifications that it would require several volumes in the telling. The machinery that has been set in motion is fairly stupendous. At the present time, every branch of the utility industry is doing high class publicity and public relations' work. For example, there is the Bell Telephone System, with its nation-wide organization of publicity workers, directed from offices in New York. Next come the independent telephone companies—thousands of them—who are holding up their heads and telling their own story with marked results. Then there are the electric light and power, street railway, gas and water companies—all gathered together in their respective national associations, carrying on through central headquarters and through effective local follow-up effort, a variety of publicity programs, the cost of which mounts up well into the millions. It is estimated that the gas, electric central station, telephone and street railway industries will spend a total of $7,500,000 this year for advertising, including institutional, good

will, merchandising, "business building" and the disposal of something like $175,000,000 worth of junior securities to customers.

But that doesn't tell half the story. There must be included the twenty-five committees on public utility information. Their work extends into every nick and corner of a majority of states, giving the national effort a local application which is invaluable and building up a friendly contact between utility executive and publisher. To this must be added the reports and papers on publicity presented at the state, district and national association meetings; and not the least important, the cooperative advertising done by banks, security houses, insurance companies, manufacturers and thousands of dealers scattered everywhere. Altogether, the publicity given today to the public utility industry is engaging the full time of several hundred persons and its total annual cost might be conservatively estimated at $10,000,000.

Yet, with all the vast machinery that has been set in motion, one hears the statement every day: "What we need is more publicity." We do need more publicity and we will get it in increasing amounts if we continue to work for it. An expenditure of ten million dollars each year to sell ourselves and our services to the public is a huge sum in the aggregate but it is only a drop in the bucket when based on the total annual gross income of the utility industry. The fact that 1923 appropriations for newspaper advertising in the gas business are nearly double those for 1922, is one of the most pleasing bits of information ever disseminated. However, the electric light and power people have a better record than that—and so have the telephone people. The gas industry, in fact, has just started. But the start has been a good one and the outlook is optimistic.

What Is Gas?

Gas is coal stripped for action, with all the labor, ashes and muss removed.

Gas is the most reliable fuel. It is more reliable than coal or oil. To fully appreciate this, ask your coal dealer, or your oil dealer, what his additional charge will be to guarantee for the next few years, to deliver night or day, at your home, in less than one second's notice, any quantity of fuel you wish.

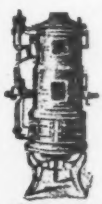
Your gas company practically makes this contract with you when it installs a meter.

Will there be enough HOT WATER *for* ME?

AFTER the baby has had her bath, after the hot water supply has been used all day, will there be enough hot water left for you? If you are depending on an old-fashioned way of heating water your chances for a hot bath are slim.

But if your hot water is supplied by a Pittsburg Automatic it makes no difference how many baths come before yours. There is always plenty of hot water—instantaneous, clean, pure water—so hot you have to temper it with cold.

And this water is heated cheaper *per gallon than it can be done in any other way.*



Bear in mind that Pittsburg Water Heaters are made and guaranteed by the oldest and largest manufacturers of copper coil heaters in the world, a company with a reputation extending over a quarter of a century.

There are eighteen different types and sizes of Pittsburg Water Heaters. One of them was made to give your home hot water in the most efficient—most economical way. You can buy a Pittsburg on an easy-payment plan that allows you practically to make your own terms.

Look up the Pittsburg dealer in your city—the gas company or one of the prominent plumbers, or write us the number of hot water faucets in your home and the number of people in your family. We will recommend the proper size Pittsburg for your needs. At the same time we will send you a free copy of "Hot Water," an interesting little book, which tells the whole story of better hot water service.

PITTSBURG WATER HEATER CO.
Pittsburgh, Pa.

Pittsburg
AUTOMATIC GAS
WATER HEATERS
"If it's done with heat, you can do it better with gas"

Another sample of advertising copy appearing in national publications and using the slogan.

You don't ride this way

you buy a

and pay for one seat instead of the whole car. Is there any reason why you shouldn't be as sensible when it comes to

The unit system of heating appeals to people who dislike paying for yards when they need inches. Unit heating means heat *where* it is needed and *when* it is needed—and only there.

It means heat by *degree*—instead of by the ton, the gallon or the month. It is *thrifty* heat.

"*Steam Heat with Gas*"

Gasteam

The heat produced by Gasteam is *steam* heat. But each radiator is a plant in itself, individually controlled. The cellar space, otherwise occupied by coal, ashes and boiler, can thus be turned to profitable use.

"Gasteam heating," says one business man, "means a distinct saving in fuel, rentable space, labor, and in certain instances, insurance rates."

There is no soot or odor. Janitor service is dispensed with. The constant fear of frozen pipes is ended. Capital is not tied up in fuel—gas is paid for as it is used. And as the radiators regulate themselves, there is no waste of heat in mild weather.

A Gasteam system of individual steam-heating units can be quickly installed in any kind of building, old or new, where gas is available.

Let us send you the complete story of Gasteam.

JAMES B. CLOW & SONS
General Offices:
536 S. Franklin St.
Chicago

"*If it is done with heat, you can do it better with Gas*"

CLOW

Sales Offices Everywhere

WANTED!

Samples of Gas Company Advertising

At Atlantic City, June 4 to 8, the American Gas Association is going to exhibit to the ten thousand and more advertising men who will attend the Associated Advertising Clubs Convention as many samples of advertising done by its member gas companies as it can collect between now and that date.

We want all sorts of advertising material, — newspaper advertisements, circulars, pamphlets, booklets, etc. And we want to make the dominant note of our display, Public Relations or Good Will Advertising.

Uninformed persons accuse the gas industry of being backward in advertising. Let's prove the reverse with a first class exhibit.

Here is the opportunity of a life time to let the advertising profession know about your company and its advertising.

Send samples to A. G. A. Headquarters.

Take Advantage of These Services

Good Will Literature

"The Story of What a B.t.u. Should Be to You" is the title of our latest booklet, designed for distribution direct to the public. It is a sixteen-page, illustrated booklet, written in a popular, narrative style to make clear the true meaning of the term B.t.u. This is the first literature of its kind ever prepared on the B.t.u. Price: $22.00 per thousand copies, including cost of imprinting company name and address on rear cover. Special price of $20.00 per thousand on orders for 10,000 copies and over.

Other booklets available: "Hints for the Housewife," a sixteen-page, illustrated booklet full of practical, money-saving information for the users of gas. Price: $20.00 per thousand copies, including imprinting. Special price of $17.50 on orders for 10,000 or more.

"Truths about the Meter," an eight-page, popular treatise on the accuracy of the meter with complete instructions regarding meter reading, etc. Same price as above. "The Men Who Make Friends," a sixteen-page pamphlet for the employee. Available in small quantities free of charge.

Miscellaneous

"Gas Chemists' Handbook," 1922 Revised Edition, $6.00 a copy; "Ideas for Window Displays of Gas Merchandise," $2.00 a copy; "The Public Utilities," a 96-page booklet containing a wealth of informative matter in the public utility industry, sample copies free; "Salient Features of Electric Cooking, Electric Hot Water Heating and Electric House Heating," by S. S. Wyer, sample copies free; "Heating Water by Gas," a 25-page illustrated pamphlet giving proper methods of installing all types of gas-fired water heating equipment, the estimation of requirements, selection of proper equipment, etc., sample copies free; "Gas in the Industries," a pamphlet containing 18 photographs and accompanying text matter describing some important industrial uses for gas, sample copies free; "The Hygenic Value of Gas Lighting," a 20-page pamphlet by R. F. Pierce, sample copies free; Sales Promotion Bulletin for April-May-June, sample copies free.

Illustrated Lecture

Our lecture on the gas industry is accompanied by 72 lantern slides showing gas at work in the home and in a score of industries. It is a popular presentation of the story of gas designed for use before customers, employees and public meetings. The lecture is in manuscript form and may be used with or without the slides. There is no charge for this service.

The New Film

"Around the Clock with Gas" is a 1,000-foot film taking about 15 minutes to project. It is a high-class, educational film depicting the gas industry and the part it plays in the domestic and industrial life of the nation. It can be included in the regular program of any motion-picture house and can also be shown to clubs, schools, social and civic organizations, employees' meetings, etc. Prints of

the film are loaned to companies upon request, the only cost being the payment of parcel post shipping charges. Prints may also be purchased outright at $75.00 each, complete with reel, container and shipping case.

Advertising Copy Service

A monthly service of 13 illustrated advertisements complete with matrices for newspaper reproduction. Service includes five good-will "ads" each month and eight appliance selling "ads" covering every major commercial activity of a gas company. Cost of service is $5.00 a month or $60.00 a year, payable quarterly in advance. More than 200 company member subscribers are now using this service with good results.

A pamphlet containing 12 A. G. A. good-will "ads" and proofs containing 48 Chat "ads" will be sent free upon request.

* * *

The Gas House Terrier

He was a grimy Terrier from the gas house down beyant.
Of chemistry and algebra his knowledge true was scant;
But he'd a horny fist and an honest face and the grit of a brindled pup.
He didn't go much on photometry, but he kept his holder up.

He knew his trade as 'twas known of old, when our lighting trade was new,
His shift began when he spat on his hands and ended—when he got through.
Before the time when the technical boy the light of his learning flung
On all that was dark in the gas man's ways, when McMillin and I were young.

He'd charge his coal and clean his fire, and trundle out his coke.
And pump his drips and light his lamps, before a quiet smoke.
What if his heats were a dull, dull red, and his highest yield three eight,
The stuff brought in four plunks per M—the consumer paid the freight.

A man of mark was the gas man then, as he walked along the street,
And you'd know him in church or wherever he went by the smell of the tar on his feet.
He had the respect of his customers, tho' his meters got a bad name;
He 'lowed the things had wheels in their heads; but they got there just the same.

An honest man, he is passing on, hats off as he makes his bow;
We're making gas on a different plan, his time is over now.
We're making gas as Tybalt fought, by the book of arithmetic,
It's a sheepskin you want if you'd get ahead, not skill with the shovel and pick.

As we welcome the logarithmic boy, with his tubes and his chemical stuff,
Let us not forget the Terrier lad, who broke the way when the way was rough.
Here's to his joy, wherever he goes, and may never a fate be sweeter
Than his, when death cuts off his gas, and Gabriel takes his meter.

WALTON CLARK, *Vice-President U. G. I. Co.*

MANUFACTURERS SECTION

F. A. LEMKE, Chairman — G. W. PARKER, Vice-Chairman

C. W. BERGHORN, Jr., Secretary

MANAGING COMMITTEE—1923

At Large

BAILEY, JR., E. P., Cleveland, Ohio
COLLINS, D. J., Philadelphia, Pa.
CRANE, WM. M., New York, N. Y.
DE HART, JR., J. S., Newark, N. J.
DICKEY, E. S., Baltimore, Md.
GREENE, J. J., New York, N. Y.
KNAPP, F. H., Pittsburgh, Pa.
MAXON, H. R., Muncie, Ind.
MCDONALD, DONALD, New York, N. Y.
NORMAN, E. A., New York, N. Y.
ROBERTS, EARL W., Detroit, Mich.
SIMLER, O. P., Lorain, Ohio
STITES, TOWNSEND, Gloucester, N. J.
TAPPAN, W. H., Mansfield, Ohio.

Representing Affiliated Societies

ABBOTT, M. E., Taunton, Mass. (Gas Sales of N. E.)
BARTLETT, C. E., Philadelphia, Pa. (New Jersey)
BARTLETT, C. E., Philadelphia, Pa. (Pennsylvania)
CREVISTON, A. E., Baltimore, Md. (Southern)
GIBSON, W. R., Toronto, Ont., Can. (Canadian)
HAMMOND, E. W., San Francisco, Cal. (Pacific Coast)
MCCULLOCH, CHARLES, Milwaukee, Wisc. (Wisconsin)
NORTON, ARTHUR E., Boston, Mass. (N. E. Gas Eng.)
PARKER, JOHN F., Rockford, Ill. (Indiana)
ROPER, GEO. D., Rockford, Ill. (Illinois)
ROPER, GEO. D., Rockford, Ill. (Iowa)
SEIDENGLANZ, C. H., Dallas, Texas (South Central)
SMITH, W. L., Battle Creek, Mich. (Michigan)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Exhibition—F. A. LEMKE, Kalamazoo, Mich.
Nominating—J. S. DEHART, JR., Newark, N. J.
Division of Accessories Manufacturers—EARL W. ROBERTS, Detroit, Mich.
Division of Apparatus & Works Manufacturers—D. J. COLLINS, Philadelphia, Pa.
Division of Gas Range Manufacturers—W. H. TAPPAN, Mansfield, Ohio.
Division of Heating Appliance Manufacturers—E. P. BAILEY, JR., Cleveland, Ohio.
Division of Industrial Appliance Manufacturers—H. R. MAXON, Muncie, Ind.
Division of Lighting Appliance Manufacturers—TOWNSEND STITES, Gloucester, N. J.
Division of Meter Manufacturers—DONALD MCDONALD, New York, N. Y.
Division of Office Labor Saving Devices—E. A. NORMAN, New York, N. Y.
Division of Water Heater Manufacturers—O. P. SIMLER, Lorain, Ohio.
Division of Supply Manufacturers—J. J. GREENE, New York, N. Y.

A. G. A. Specifications

The following is another example of how our manufacturers are supporting the A. G. A. Specifications. It is a four-page printed letter sent by this manufacturer to their clientele. (EDITOR'S NOTE.)

Gentlemen:—

Subject: A. G. A. Construction in Gas Ranges.

A number of gas ranges have been placed on the market recently—of good appearance but inferior construction. Some of these are so poorly built, they cannot possibly give satisfactory results either as an efficient cooking apparatus or for durability and long life.

Inasmuch as these ranges are of good appearance, and the features making for economy in gas consumption, uniform baking, etc., can, perhaps, be detected only by an experienced eye, we deem it well to refresh our memories on what A. G. A. construction really means.

The American Gas Association specifications are not a compilation of eccentric notions, but the sound, deliberate reasoning of America's best gas engineers; published for the protection of the purchaser unfamiliar with the details of gas range construction.

By way of comparison, we are herewith submitting a detailed summary, point for point, of an inferior range as compared with our A. G. A. Specifications range.

Very truly yours,

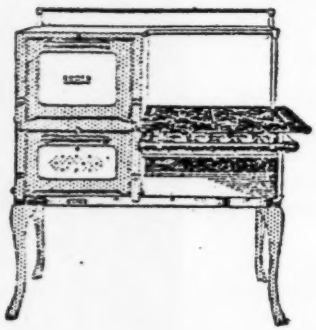
MANUFACTURERS OF A. G. A. SPECIFICATION APPLIANCES.

CABINET GAS RANGE Built to A. G. A. Specifications		CABINET GAS RANGE Inferior Construction	
WEIGHT			
Net,	180 lbs.	Net,	153 lbs.
DIMENSIONS			
Length—Less End Shelf,	42"	Length—Less End Shelf	44"
With End Shelf,	45"	No End Shelf on Range	
Height,	48"	Height,	50¾"
Depth (Less Manifold),	22½"	Depth (Less Manifold),	21¾"
Cooking Top Opening,	20 x 20"	Cooking Top Opening,	19 x 19"
Baking Oven,	16 x 18 x 12"	Baking Oven,	16 x 18½ x 13¾"
Broiling Oven,	16 x 18 x 9"	Broiling Oven,	16 x 18½ x 9½"
SHEET METAL			
24 gauge—3 pass Steel—Baked japanned.		26 gauge sheet iron—not japanned.	
OVEN LININGS			
Insulation:		Insulation:	
Sides: dead air space.	½"	Sides: dead air space,	None
Sides: flue,	1"	Sides: flue,	1½"
Back: air insulation and flue,	1⅛"	Back: air insulation and flue,	None
Top: air insulation and flue,	1⅜"	Top: air insulation and flue,	½"
Weight: one side lining—24 gauge—7 lbs. 7 ozs.		Weight: one side lining—26 gauge—3 lbs. 3 ozs.	
Linings: flues and baffles provide ample insulation and insure even distribution of heat.		Linings: provide no insulation and make no provision for distributing heat.	
Linings easily removable and held in place without bolts.		There is no back lining whatever. Side Linings not removable.	
BURNER BOX LINING			
Sides and back made of 24 gauge galvanized iron.		No back lining—sides made of 26 gauge black iron.	
Easily removable for repairs.			
OVEN TOPS			
Outside Top,	18 gauge	Outside Top,	26 gauge
Broiling Oven Top (or Baking Oven Bottom) weight. 8 lbs. 3 ozs.		Broiling Oven Top (or Baking Oven Bottom) weight, 3 lbs. 4 ozs.	
Built of 2 sheets of 18 gauge steel, with dead air space insulation.		2 sheets of 26 gauge sheet metal are used, with no dead air space insulation and a sheet of 1/32" asbestos is loosely inserted.	
EXTREME BOTTOM			
Readily removable as one piece.		Not removable—bolted in.	
OVEN RACK SUPPORTS			
Corners rounded to prevent cutting hands. So formed as to support the racks firmly with two thicknesses of 24 gauge sheet iron.		Sharp corners—liable to cut hands. Racks supported by single thickness only—supports easily bent.	
FLUE COLLAR			
So ventilated that the placing of a vessel over the collar will not prevent the oven products from escaping.		Flue Collar not ventilated—a vessel placed on the collar would smother oven burners.	

CABINET GAS RANGE Built to A. G. A. Specifications.	CABINET GAS RANGE Inferior Construction.
DOORS	
Both doors have springs.	Broiler door has no spring or counter-balance.
Both doors flush.	Broiler door not flush with inside surface.
Possible to observe oven burner without opening either baking or broiling oven door.	Lining of broiler door has no openings—not possible to observe burner.
TOP GRATES	
Weight, 5 lbs. 2 ozs.	Weight, 4 lbs.
Top surface 3/16" above level of top frame, thus supplying ample ventilation and secondary air to burner even with large vessel in use.	Surface 1/16" above level of top frame.
Grates interlock firmly in center.	Grates do not interlock in center—very light and easily warped.
END SHELF	
Made of cast iron.	No end shelf.
TOP BURNERS	
1 giant, 3 single and 1 simmering burner.	4 single burners—no simmering.
Ports around center opening of burners drilled at an angle to prevent smothering.	Burner will smother—ports around center opening not drilled on an angle.
OVEN BURNER	
Width of Loop Oven Burner, 6¾"	Width of Loop Oven Burner, 3½"
Mixer tube fastened to burner proper with threaded joint—diameter of mixer tube full ¼", with no obstructions. Burner and mixer tube so designed as to give maximum velocity to air and gas mixture at ports. This is to prevent back-firing.	Too narrow to provide proper distribution of heat. Mixer tube fastened to burner proper with loose bolted joint—liable to leaks. Mixer tube at this point reduced to ⅜", thus impeding the velocity of the air and gas mixture, and preventing proper combustion, also promoting back-firing conditions.
Burner easily removable.	Bolted in and not removable.
OVEN BURNER SUPPORTS	
Attached to rack supports.	Attached to outside body.
Burner securely sprung in place.	No provision for securing burner in place.
OVEN LIGHTER	
Oven lighter part of burner proper, extending to within 2½" of front.	None—7½" from front of range to oven burner.
AIR MIXERS	
End of burners machine-finished flat, so as to prevent leakage of air.	End of burners not faced flat—shutter does not fit tightly.
AIR SHUTTERS	
Improved shutter has seven positive adjustments—is easily operated without removing set bolt, but cannot be moved until bolt is "unscrewed," thus preventing an accidental change of adjustment.	No provision for locking mixer cap in adjusted position.
COCKS	
"Standard Gas Range Cock" used.	Cock not of approved standard type.
Barrel 1¼" long, with spring and washers to take up all wear.	Barrel ¾" long—no provision made for taking up wear.
Exposed parts nickel-plated.	Exposed parts not nickel-plated.
Oven burner cock handle of flat metal, distinguishing design and marked "oven."	Oven burner cock handle same as top burners.

CABINET GAS RANGE Built to A. G. A. Specifications.	CABINET GAS RANGE Inferior Construction.
MANIFOLDS	
Made of ¾" extra heavy pipe. Polished ells and caps. End manifold support of cast iron, securely fastened.	½" standard iron pipe. Ells and caps not polished. End manifold support of sheet iron, loose fitting.
BURNER TRAYS	
24 gauge—die stamped—tight corners, amply large to catch all drippings.	26 gauge—hand formed with open corners, not of sufficient depth to catch drip; ½" too short, leaving opening at front.
OVEN RACKS AND BROILING PAN	
2 Oven Racks. Broiling Pan 24 gauge, size 16" x 16".	1 Oven Rack. Broiling Pan 26 gauge, size 16" x 11".
PLATE SHELF	
Rigidly fastened with special casting. Plate Shelf ventilated. Made of 26 gauge, 3 pass, polished steel.	Poorly supported—fastened to oven side with but one bolt. Not ventilated—will rust on under side and throw steam from foods in cook's face. Made of 26 gauge, 1 pass, plain black steel.

The New Ranges Are Here



Look them over. Let us explain the latest convenience and economy features. Learn why it is to your advantage to buy a range built according to American Gas Association specifications.

Especially attractive and sanitary are the ranges finished in white and gray enamel.

If you cannot conveniently visit one of our showrooms, ask us to send a representative.

THE UNITED GAS IMPROVEMENT CO.

"BUILT ACCORDING TO SPECIFICATIONS."

A talking point that rings true.

COMMERCIAL SECTION

WILLIAM GOULD, Chairman — J. E. DAVIES, Vice-Chairman

LOUIS STOTZ, Secretary

MANAGING COMMITTEE—1923

At Large

BARNES, CYRUS, Boston, Mass.
BARTLETT, C. E., Philadelphia, Pa.
COLLIER, WILLIAM, Poughkeepsie, N. Y.
DUTTON, L. R., Jenkintown, Pa.
EVES, PHILMER, New Haven, Conn.
HANLAN, J. P., Newark, N. J.
HUMPHREY, H. E., New York, N. Y.
JONES, J. B., Bridgeton, N. J.
KAHN, B. B., Hamilton, Ohio
KNAPP, F. H., Pittsburgh, Pa.
MACSWEENEY, J. P., Rochester, N. Y.
MILENER, E. D., Baltimore, Md.
MURRAY, J. J., Biddeford, Me.
MYERS, J. B., Philadelphia, Pa.
NEWMAN, H. H., Trenton, N. J.
POLLITT, L. I., Baltimore, Md.
POST, A. P., Philadelphia, Pa.
QUINN, J. J., Quincy, Mass.
RASCH, W. T., New York, N. Y.
SMITH, D. R., Baltimore, Md.
STANNARD, C. N., Denver, Col.
STEPHANY, E. J., Pittsburgh, Pa.
STETSER, J. R., Gloucester, N. J.
TAYLOR, J. D., Baltimore, Md.

Representing Affiliated Societies

BURKE, E. J., Indianapolis, Ind. (Indiana)
CORL, W. F., Mexico, Mo. (Missouri)
CRAFTS, H. C., Pittsfield, Mass. (N. E. Gas Eng)
CRANKSHAW, J. W., Allentown, Pa. (Pennsylvania)
CRAWFORD, H. M., San Francisco, Cal. (Pacific Coast)
DOBBINS, H. A., Mt. Vernon, N. Y. (Empire State G. & E.)
FLAUTT, J. J., New Orleans, La. (South Central)
GOSS, A. J., Ottumwa, Ia. (Iowa)
HANLAN, J. P., Newark, N. J. (New Jersey)
JOHNSON, W. B., Toronto, Can. (Canadian)
LEARNED, J. G., Chicago, Ill. (Illinois)
MCDONNOLD, H. E., Greenville, S. C. (Southern)
QUINN, JOHN J., Quincy, Mass. (Gas Sales of N. E.)
SCHROEDER, A. G., Grand Rapids, Mich. (Michigan)
ST. JOHN, JOHN, Madison, Wis. (Wisconsin)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Cooperation with Architects and Builders— R. S. DOULL, New York, N. Y.

Cooperation with the Plumber and Heating Dealer— F. H. KNAPP, Pittsburgh, Pa.

Home Economics Service Bureau—PHILMER EVES, New Haven, Conn.
Industrial Gas—E. J. STEPHANY, Pittsburgh, Pa.
Retail Pricing—A. P. POST, Philadelphia, Pa.
Sales Stimulation—J. E. DAVIES, Chicago, Ill.

What Your Commercial Section is Doing

THAT INTANGIBLE thing, which for a better term, has been described as "a national spirit of work and cooperation and service" was strongly exemplified when twenty members of the Managing Committee gave their time and travelled in some cases hundreds of miles to attend a meeting at Association Headquarters on March 29th.

It is just such a spirit of service and cooperation as this which dominates the efforts of the Association and which is responsible for the success of our many activities. Our members will be gratified to know that substantial progress has been made by our Commercial Section committees, all of which are devoting their energies in the giving of useful service during the year.

Sales Activities

Mr. J. E. Davies reported for his Sales Stimulation Committee that they had already issued two special sales bulletins, copies of which had been distributed to each member company of the Association.

The first bulletin covered the question of how to stimulate the sale of gas appliances during the months of January,

February and March,—the second bulletin outlined a complete sales plan for an automatic water heater campaign during April, May and June.

Another bulletin is in course of preparation suggesting sales methods on general gas merchandise during the spring months.

Still another bulletin emphasizing the necessity for removing the old and obsolete appliances from the lines with the suggestion that such a sales activity be engaged in during July and August will be issued later on, as well as a final bulletin covering sales activity during the last four months of the year.

The many complimentary expressions received by the Chairman and at Association Headquarters indicate that these sales bulletins are helpful to our membership and that the plans advocated therein are being adopted with gratifying results.

Plumber Co-Operation

The Committee on Cooperation with the Plumbing and Heating Dealer will within a few weeks be ready to issue a bulletin designed to assist member gas companies in establishing friendlier relations and cooperative working agreements with the plumbers and dealers in their respective localities. In every case where such arrangements have been made between the gas company and the plumber it has been of reciprocal advantage to all the parties concerned. The National Association of Master Plumbers has just invited the Association to send a representative to address its membership at their annual meeting in Atlantic City in June.

Home Economics Service Departments

The establishment of Home Economics Service Departments by gas companies is a subject which has been receiving considerable attention lately, and our committee headed by Mr. Philmer Eves of New Haven has about completed a report which will be issued to member companies as a special bulletin in which definite recommendations will be made as to how such departments may be organized and operated.

The promotion of gas sales and the establishment of good will relations with the company's customers through the effective work of a Home Economics Service Bureau will at once commend itself as a worth while undertaking for every company to engage in.

Industrial Gas

The Industrial Gas Committee, headed by Mr. E. J. Stephany of Pittsburgh, is engaged in the preparation of a number of booklets covering the subjects of wholesome baking, steam boilers, large volume water heating, hotel and restaurant uses, house heating and combustion. A sub-committee will, in cooperation with the Sales Stimulation Committee, prepare a special sales bulletin dealing with the industrial use of gas.

The committee will also revise the original pamphlet "1000 Uses for Gas" originally published by the National Commercial Gas Association.

Educational Folders

Announcement will soon be made to our member companies of a plan for the Association to syndicate a series of six educational folders which gas companies may distribute to their consumers. These folders known as "The Home Maker," a domestic science monthly, will deal with various phases of the care and operation of the home, with particu-

lar reference to the use of gas in the home. Publicity material of this character will appeal particularly to those companies which have not the facilities for turning out folders of this character. It is anticipated that finished sample copies of the first folder will be available for inspection on or before May 1st.

Convention Program

Mr. J. E. Davies, whose address is Peoples Gas Stores, Inc., 122 South Michigan Avenue, Chicago, Illinois, was appointed chairman of the committee to plan the Commercial Section's program for the Atlantic City Convention in October.

We want to make our convention program as instructive and interesting as possible, therefore an open invitation is extended to the membership to suggest topics for discussion at the Commercial Section sessions. Send your suggestions to Mr. Davies—he will be glad to have your ideas as to what a convention program should be.

The Size of the Utilities

From an address delivered by Mr. P. S. Young before the Students of Rutgers College. (EDITOR'S NOTE.)

AT THE present time the capital invested and the annual gross earnings of these utilities are as follows:

	Capitalization	Annual Gross-Earnings
Electric	$ 5,000,000,000	$ 1,000,000,000
Gas	2,500,000,000	600,000,000
Railway	5,500,000,000	1,000,000,000
	$13,000,000,000	$ 2,600,000,000

In order that you may better visualize the investment in these industries, we will compare them with other representative industries:

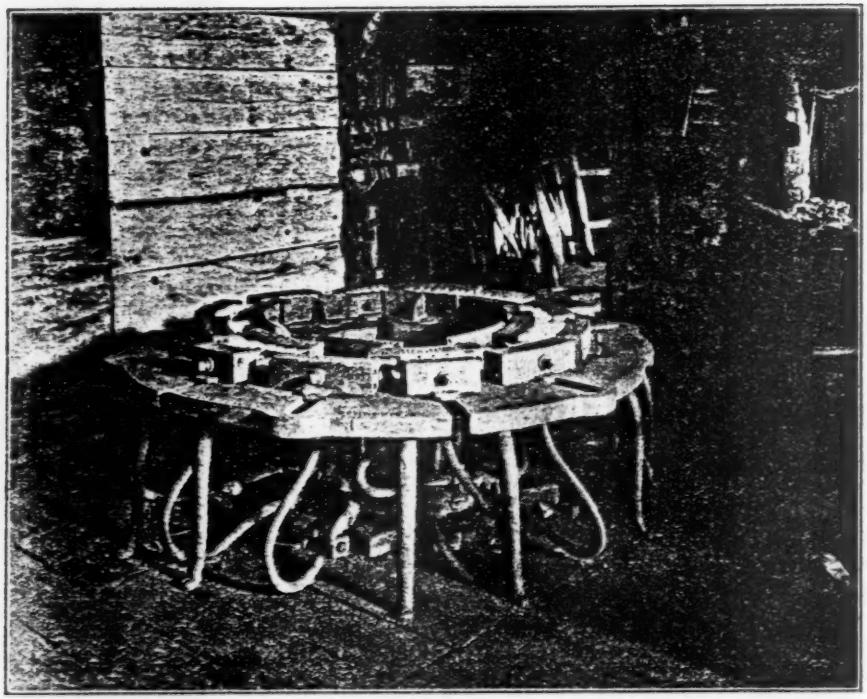
	Capitalization
Iron & Steel Works—Rolling Mills and Blast Furnaces,	$ 3,577,500,000
Paper & Wood Pulp Mills,	1,000,000,000
Refining Petroleum Industry,	1,200,000,000
Printing & Publishing (including Newspapers),	1,200,000,000
Shipbuilding Industry,	1,400,000,000
Slaughtering & Meat Packing,	1,200,000,000
Automobile (including Body and Parts),	1,800,000,000
Rubber Industry,	960,070,726
Cotton Industry,	2,914,919,506

The greatest industry in this country is that of the steam railroad with a capitalization of $20,000,000,000 and annual gross earnings of $2,750,000,000.

While these figures indicate the present stage of utility development they do not by any means tell the whole story with regard to their growth. The demand for these services is a tremendous one and the consequent capital requirement is also very great. It has been estimated that the annual capital requirements of these utilities is as follows:

	Annual Capital Requirements
Electric	$ 1,000,000,000
Gas	350,000,000
Railway	250,000,000
	$ 1,600,000,000

These utilities furnish so many necessities and conveniences to the public that one hardly realizes how dependent we are upon them. We go to work and we come back with their aid. We utilize their light and power and their heat in so many ways that it is impossible to enumerate them. It is perhaps not too much to say that city life is only possible with their aid.

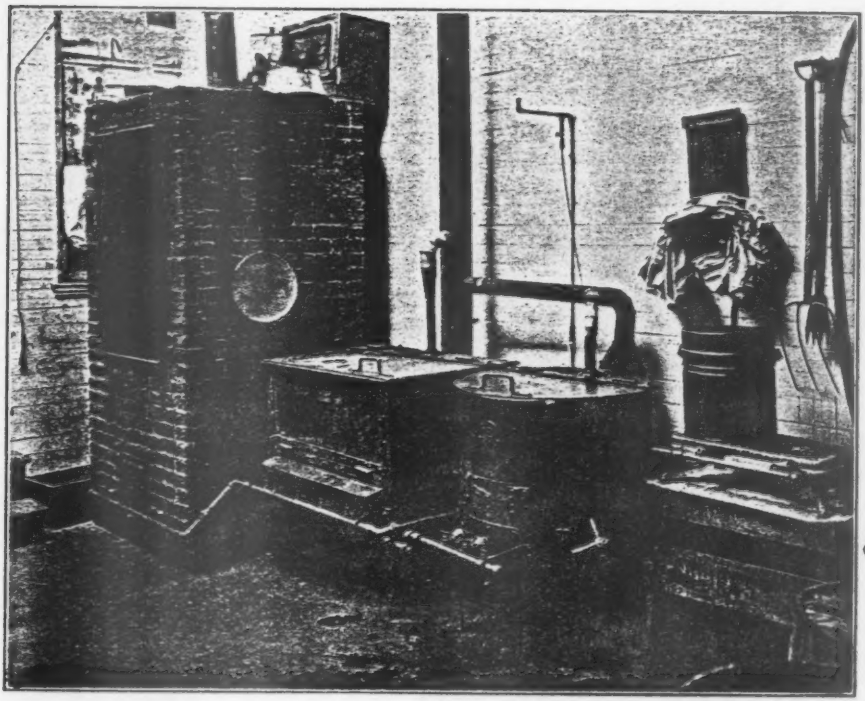


Tire-Heating

The owner and operator of the gas-fired tire-heater illustrated here is a strong booster for gas. He says that this type of work, fitting wagon tires, should always be done with gas because it saves room and labor and improves the workmanship.

The hourly consumption is about 800 cu. ft.
The monthly consumption is about 5600 cu. ft.

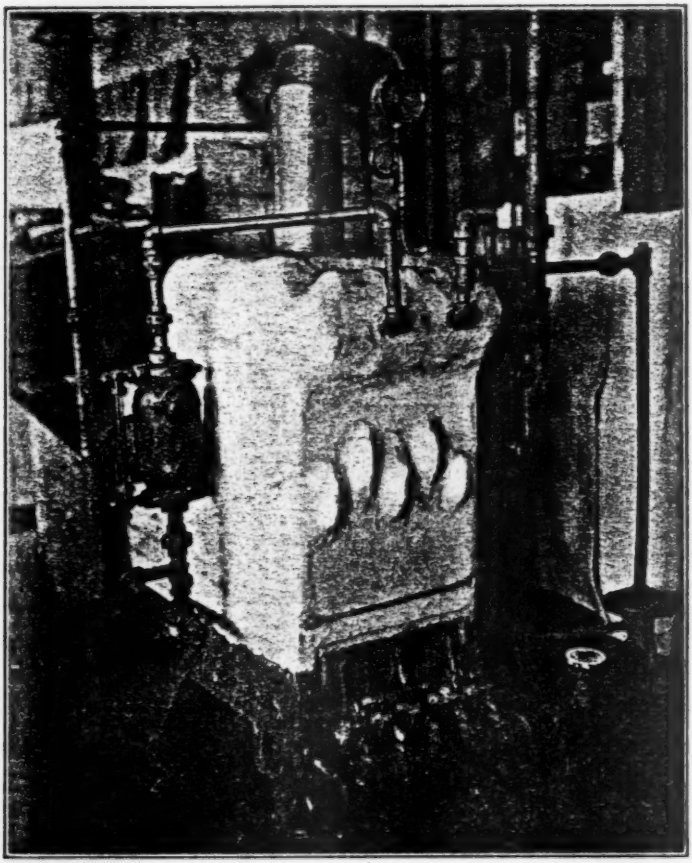
For more detailed information, apply to A. G. A. Headquarters.



The Making of Sausages, Frankfurters and Bologna

Gas is used in the installation shown above for the cooking of sausages, frankfurters, bologna, pressed ham, minced ham, etc., and for the smoking of hams, bacons, etc.

The capacity is 800 lbs. per day, cooked and smoked, and the appliances use 350 cu. ft. of gas average daily, giving an average monthly consumption of 10,300 cu. ft.



Gas in the Shoe Industry

Gas-fired steam boiler furnishing steam for drying racks and steam boxes for box-toe softening.

The boiler shown is equipped with fuel control, governors and automatic water feed, and the gas consumption is 1900 cu. ft. per day with a factory output per day of 800 pairs of shoes.

For further information apply to A. G. A. Headquarters.

Atlanta Gas Salesmen Organize "Flying Squadron" Club

MEMBERS of the Sales Department of the Georgia Railway and Power Company of Atlanta, Georgia have organized the "Flying Squadron Club," the object of which is to promote general interest and a spirit of good fellowship between the gas and electric appliance salesmen.

The formation of such a club is a step in the right direction. Of recent years we have heard of very few gas company organizations of this character. There was a time, and not so many years ago, when any number of such organizations were flourishing. The opportunities thus afforded for the employees to become more intimately acquainted, to discuss various phases of their every day work, to secure solutions of their own particular problems and to gain a more intimate knowledge of their company's policy and plans, all help to gain greater interest and efficiency on the part of each individual in the organization.

Employee clubs can be made a big factor in establishing an esprit de corps which is so essential to the successful carrying on of any business, and we cannot urge upon our member companies too strongly the importance of such cooperative effort.

The officers of the Atlanta "Flying Squadron Club" are L. G. Fields, President; John M. Stone, Vice-President; Miss Annarene Walters, Secy-Treas. and LeRoy R. Garberg, Publicity Correspondent.

Correspondence with other gas companies which have or contemplate organizing similar clubs is solicited by Mr. Garberg.

The spirit with which the management enters into movements of this character will reflect itself in the interest and effectiveness of the work done by the entire personnel of the company.

Correction in Standing of Gas Companies in Appliance Sales Per Meter Contest

Through a regrettable error, the name of the Emporia Gas Co., Emporia, Kansas, did not appear in the listing of the leading ten companies in the Appliance Sales Per Meter Contest on page 242 of the April Monthly.

This company's name should have been fifth on the list of Northern Companies, with an average of $1.16 of appliance sales per meter per month.

Associations Affiliated with A. G. A.

Canadian Gas Association
Date of Affiliation—Mar. 25, 1919
Pres.—Col. D. R. Street, Ottawa Gas Co., Ottawa, Ont., Can.
Acting Sec.-Tr.—E. A. Hills, Consumers' Gas Co., Toronto.
Conv., 1923.

Empire State Gas and Electric Association
Date of Affiliation—Nov. 21, 1919
Pres.—M. J. Brayton, Utica Gas & Electric Co., Utica, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.
Conv., 1923.

Illinois Gas Association
Date of Affiliation—Mar. 19, 1919
Pres.—Robert B. McDonald, Peoples Power Co., Moline, Ill.
Sec.-Tr.—R. V. Prather, 305 Illinois Mine Workers Bldg., Springfield, Ill.
Conv., 1924.

Indiana Gas Association
Date of Affiliation—April 24, 1919
Pres.—F. B. Tracy, Central Indiana Gas Co., Muncie, Ind.
Sec.-Tr.—E. J. Burke, Citizens Gas Co., Indianapolis, Ind.
Conv., West Baden Springs Hotel, West Baden, Ind., May 7, 8, 1923.

Iowa District Gas Association
Date of Affiliation—May 21, 1919
Pres.—H. B. Maynard, Citizens Gas & Electric Co., Waterloo, Ia.
Sec.-Tr.—H. R. Sterrett, Des Moines Gas Co., Des Moines, Ia.
Conv., 1924.

Michigan Gas Association
Date of Affiliation—Sept. 18, 1919
Pres.—Fred W. Seymour, Battle Creek Gas Co., Battle Creek, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.
Conv., Grand Rapids, Mich., Sept. 19-20.

Missouri Association of Public Utilities
Date of Affiliation—June 18, 1920
Pres.—E. R. Locke, Missouri Utilities Co., Mexico, Missouri.
Sec.-Tr.—F. D. Beardslee, 315 N. 12th St., St. Louis, Mo.
Wiley F. Corl, Chmn. Affiliation Com., Missouri Utilities Co., Mexico, Mo.
Conv., 1923.

New England Association of Gas Engineers
Date of Affiliation—Feb. 19, 1919
Pres.—C. E. Paige, C. H. Tenney & Co., Boston, Mass.
Sec.-Tr.—J. L. Tudbury, Salem Gas Light Co., Salem, Mass.
Conv., Boston, 1924.

Gas Sales Association of New England
Date of Affiliation—Oct. 1, 1919
Gov.—F. A. Woodhead, Arlington Gas Light Co., Arlington, Mass.
Sec.—M. Bernard Webber, 150 Congress St., Boston, Mass.
Annual Meeting, 1923.

New Jersey Gas Association
Date of Affiliation—April 25, 1919
Pres.—James P. Hanlan, Public Service Gas Co., Newark, N. J.
Sec.-Tr.—R. A. Koehler, Public Service Gas Co., Newark, N. J.
Conv., 1924.

Pacific Coast Gas Association
Date of Affiliation—Sept. 18, 1919
Pres.—F. S. Wade, Southern Counties Gas Co., Los Angeles, Cal.
Sec.-Tr.—W. M. Henderson, 812 Howard St., San Francisco, Cal.
Conv., Del Monte, Cal., Sept. 11-14.

Pennsylvania Gas Association
Date of Affiliation—April 10, 1919
Pres.—Grier Hersh, York Gas Co., York, Pa.
Sec.-Tr.—Geo. L. Cullen, Harrisburg Gas Co., Harrisburg, Pa.
Conv., 1924.

South Central Gas Association
Date of Affiliation—Oct. 15, 1919
Pres.—F. C. Armbruster, Southwestern Gas & Electric Co., Shreveport, La.
Sec.-Tr.—S. J. Ballinger, San Antonio Public Service Co., San Antonio, Texas.
Conv., 1923.

Southern Gas Association
Date of Affiliation—May 20, 1919
Pres.-P. H. Gadsden, The United Gas Improvement Co., Philadelphia, Pa.
Sec.-Tr.—G. H. Smith, City Gas Co., Norfolk, Va.
Conv., St. Petersburg, Fla., April 16-18, 1923.

Wisconsin Utilities Association
Pres.—Harold L. Geisse, Wisconsin Valley Electric Co., Wasau, Wis.
Exec.-Sec.—J. N. Cadby, 445 Washington Bldg., Madison, Wis.
Conv., 1924.

Geographic Divisions

Eastern States Gas Conference
Date of Formation—April 11, 1923
Pres.—P. H. Gadsden, The United Gas Improvement Co., Philadelphia, Pa.
Sec.-Tr.—L. R. Dutton, Philadelphia Suburban Gas & Electric Co., Jenkintown, Pa.
Conv., 1924.

TECHNICAL SECTION

F. C. WEBER, Chairman — H. C. WEHNERT, Vice-Chairman

H. W. HARTMAN, Secretary

MANAGING COMMITTEE—1923

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BERRY, WALTER M., Washington, D. C.
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COOK, JR., H. R., Baltimore, Md.
EATON, H. M., Detroit, Mich.
FIELDNER, A. C., Pittsburgh, Pa.
FREEMAN, F. C., Providence, R. I.
HAFFENKAMP, J. P., Rochester, N. Y.
HOWARD, A. C., New York, N. Y.
SERRILL, W. J., Philadelphia, Pa.
SPERR, F. W. Pittsburgh, Pa.
VITTINGHOFF, H., Boston, Mass.
WILLIEN, L. J., Boston, Mass.

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BROWN, J. A., Jackson, Mich. (Michigan)
CORNISH, R. C., Philadelphia, Pa. (Pennsylvania)
DUNN, F. S., Albany, N. Y. (Empire State G. & E.)
ELBERT, V. L., St. Joseph, Mo. (Missouri)
FERRIES, JAS. Atlanta, Ga. (Southern)
HALL, E. L., Portland, Ore. (Pacific Coast)
HOY, C. W., Glassboro, N. J. (New Jersey)
HUMPHREYS, J. J., Montreal, Can. (Canadian)
JOHNSON, G. M., South Bend, Ind. (Indiana)
LYONS, B. F., Beloit, Wis. (Wisconsin)
OTTEN, JR., C. H., Plymouth, Mass. (Gas Sales of N. E.)
PRICHARD, C. R., Lowell, Mass.
RICHARDSON, R. B., Peoria, Ill. (Illinois)
SEDBERRY, W. H., Marshall, Texas (South Central)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Carbonization and Complete Gasification of Coal—R. G. PORTER, Chester, Pa.
Cast Iron Pipe Standards—WALTON FORSTALL, Philadelphia, Pa.
Chemical—A. C. FIELDNER, Pittsburgh, Pa.
Coke—V. A. MILLER, Rochester, N. Y.
Deposits in Gas Pipes and Meters—DR. R. L. BROWN, Pittsburgh, Pa.
Disposal of Waste from Gas Plants—L. J. WILLIEN, Boston, Mass.
Distribution Design—R. G. GRISWOLD, New York, N. Y.
Fundamentals of Condensing and Scrubbing—W. H. EARLE, Rochester, N. Y.
Holder—H. E. BATES, Chicago, Ill.
Measurements of Large Volumes of Gas—M. E. BENESH, Chicago, Ill.
Nominating—C. N. CHUBB, Davenport, Ia.
Program of Research—DR. J. F. WING, Boston, Mass.
Purification—DR. A. R. POWELL, Pittsburgh, Pa.
Refractory Materials—W. H. FULWEILER, Philadelphia, Pa.
Specifications for Gas Coal—H. J. ROSE, Pittsburgh, Pa.
Standardization of Capacities of Consumers' Meters—WALTON FORSTALL, Philadelphia, Pa.

Some General Considerations of the Gummy Meter Problems in the Gas Industry*

RALPH L. BROWN, Associate Chemist, U. S. Bureau of Mines, Pittsburgh Experiment Station.

THE ACCUMULATION of gummy and resinous deposits in consumers' gas meters began to assume serious and troublesome proportions about 1917. As the trouble developed and spread in the several years following, it manifested itself in several ways. These ultimately began to be expressible in distinctly economic terms and more specifically in terms of costs. In 1922 an organized and fundamentally based investigation of this trouble was begun. In an earlier paper[1] a short statement of the occurrence and costs of the deposition was given and at the same time an analysis of the problem, as well as a general plan of attack, was presented. That plan included two general phases—one, a chemical study of typical gas and gas condensates from the standpoint of their gummy or resinous content, gum-forming constituents and related subjects; the other, a comparative survey of plants, both troubled and untroubled, attention being paid to construction, operation, to meter conditions and related data.

*Progress report of cooperative investigation of the U. S. Bureau of Mines and the American Gas Association.

[1]By the writer as chairman of the American Gas Ass'n Sub-Committee on Deposits in Gas Pipes and Meters in the Report for 1922.

In reporting progress in the actual investigation, it was definitely set down that the basis of the gummy deposits was the unsaturated hydrocarbons resulting from the carburetion of the water gas with oil. That the presence of oily gas condensate was closely associated with and largely responsible for the accumulation of gum and resin was made evident. That a serious change in the amount of gummy deposits extending over a period of several years was obviously due to changes in gas composition was pointed out. Those changes which enter basically into gum formation were found to involve the amount and chemical composition of the hydrocarbons of the gas and in a substantially increased oxygen content. That portion of the hydrocarbons in the gas which formed a natural condensate in the distribution system of some 20 carbureted water gas plants was shown to consist of from 30 to 50 per cent of unsaturated hydrocarbons. These were found to consist very largely of the gum-forming types.

Generally speaking, in the manufacture of gas, the chemical composition of the gas is dependent on the primary materials used, the physical equipment and the manner of operation employed. On the basis of the preceding paragraph, it also may be asserted that the composition of hydrocarbon content of carbureted water gas is dependent on the character of oil used and upon those pieces of equipment involved in the carbureting process and those which follow, and very largely on operating practice. It should also be added that the amount of gas oil employed per total volume of gas produced also exerts a definite influence on the composition under consideration.

Further analysis of these primary factors points to the possibility of innumerable investigations, all of which would give definite information valuable to the gas industry, not only from the operator's point of view, but ultimately from an economic viewpoint as well.

In the investigation of the general problem of gummy deposits, effort and emphasis have been put on those questions and phases which were judged basic or fundamental on one hand, or which, on the other, served as connecting links in chains of reasoning based on established fact and scientific principle. With this same idea in view, it seems "apropos" to point out briefly some factors which influence the amount of gum-forming constituents being passed into the distributing systems. Control of these amounts necessitates control of the factors involved.

Oil. The belief exists and is often asserted by practical operators that the character of the gas oil used has a decided influence on the occurrence of gummy deposits. An excellent and highly contributory piece of work on the valuation of gas oils was reported[1] by Downing and Pohlman in 1916. With many varying conditions and different gas oils, the results of their cracking or carbureting experiments were reported in terms of (1) candle power per gallon; (2) B.t.u. per gallon; (3) per cent gasified; (4) per cent to tar; (5) per cent to carbon; (6) candle power per pound; and (7) B.t.u. efficiency in per cent. From the standpoint of the present consideration, it is essential that the experiments be extended to give information as to the hydrocarbon constituent of the gas from various gas oils when cracked under one or more sets of selected optimum conditions. A knowl-

[1]Amer. Gas Light Jour. 105, 318 (1916); Proc. A. G. I. 4, 487.

edge of the amount and composition of the light oils in the gases so produced correlated with the usual plant factors and typical compositions should permit of interpretations of value. It should give indications of the relative amounts of those hydrocarbons shown to be capable of gum formation (and found in many systems actually giving rise to such deposits) that are actually present in the gases so carbureted. It should show relative figures for the amounts of light oil content of the present day drip oil fraction. Then with similar figures for gases sent out into distribution systems in which gum troubles occur and those in which they do not, it seems entirely logical to expect information of value.

Physical Equipment. The relation of physical character of plant equipment to composition of the gas is a manifold and obvious one. It is not the intention to discuss the relationship in this paper except as it overlaps operating practice.

Operating Practice. Carburization. The usual factors which enter into the cracking of oil for gas making purposes are involved in its relationship to gum deposition because they exert an effect on the oil gas composition. These factors are usually broadly considered as being (1) temperature; (2) time; (3) contact; (4) atmosphere, and (5) pressure. Under the present day operation the last two named are the least susceptible to variation without the entailment of general variation in production. Consequently, it seems logical to look for means of control among the first three named factors. These are greatly interdependent and permit of a flexible set of variables, a fact that apparently is often lost sight of in practice. The light oil content of carbureted water gas was found during the war to be essentially aromatic. It is well known that the thermal stability of hydrocarbons in the aromatic series decreases as one passes from benzene into its homologues. The presence in carbureted water gas of an undue percentage of light oil boiling in the solvent naphtha range is under most conditions indicative of either incomplete or insufficient cracking. The remedying of that condition involves an increased temperature or greater contact, (securable in a number of ways), or a combination of the two, resulting in a lower percentage of solvent naphtha in the light oils content of the gas. This means that the homologues have been reduced to simpler molecules of which benzene is the most stable and the end product of the series. From chart X of the Downing and Pohlman paper[1] it will be seen that an increase in temperature above 1350 deg. F. gave a slight gain in B.t.u. per gallon of oil cracked in blue gas and certainly no loss when the excess steam amounted to 10 per cent. In chart XII the volume of oil gas is shown to continue to increase sharply when the temperature mounts above 1350 deg. F.—the usually considered average optimum temperature. Both of these effects are advantageous. The practical limiting factor is, of course, found in the production of naphthalene and carbon in amounts considered to be excessive. Here, if the question of tar value be omitted, naphthalene, short of stoppages, is not a difficulty, and carbon short of interfering deposition in carburetor and superheater can usually be disregarded. With rapid and accurate methods of determining naphthalene it should prove practical to use temperatures that approach the danger point from the stand-

[1]Loc. cit.

point of naphthalene production. In the survey previously mentioned, a few plants were being operated with that aim in view. In eleven generating plants supplying carbureted water gas to systems in which no gum trouble was occurring, the average of the pyrometer readings or reported values for carburetor (bottom) temperatures was 1374 deg. F. For seven systems in which there was distinct trouble, this average value was 1329 deg. F. In the first set of eleven cases, one plant was employing a temperature below 1350 deg. F. In the second set of seven, one plant showed a value above 1350 deg. F. Within the limits imposed by the interdependency of the factors involved in cracking, these facts must be considered as significant and indicative.

For a surface fixed as to contact area and surface material the temperature and time factors are somewhat reciprocal. This means that for any usual cracking temperature an increased rate of oil input without provision for adequate increase in contact will give rise to a diminished degree of cracking. This, as noted, often brings incomplete cracking, which in a number of systems has manifested itself eventually in gummy deposits in meters. This was developed in the earlier report by the writer[1] in which an examination of columns II and V of Table 1 showed a paralleling of the occurrence of gummy deposits with the existence of the highest rates of oil inputs, as discussed in the paragraph opposite that table.

The same rather universal demand for increased production within the last half dozen years that has given rise to increase in rate of oil input has in many instances been the reason for the use of less contact. To cut down back pressure in the generating set, there has been, within the period named, a tendency to widen the spacing of the checker-brick. Until cracking by radiant heat energy is proven practical, it would follow that that measure in conjunction with increased rates of oil input is wrong as it only tends to magnify the incompleteness of the cracking. In the case of plant No. 7 in the table referred to above, an alleviation of troubles due to gummy deposits is reported to have been secured by changing back to the original closer checker-brick spacing.

In general, contact in cracking operation may involve surface quality or composition and surface quantity or area. With respect to the first, it would seem that whatever may be the cyclic period, the actual cracking surface varies progressively from a clean or "cleaned" checker-brick through various stages of "dirty checker-brick" until the carbonaceous covering is such as to require cleaning. Except in the time element, this surface factor is rather uniform. The quantity factor from the standpoint of molecular impingement is controllable through the manner and closeness of spacing and through the velocity of oil-bearing gas through the checker-brick. (Efficient distribution of the oil in the water gas stream has been assumed for purpose of this paper.) This velocity for a particular installation is relatively fixed by the capacities of the components of the set and by the demands of production needs. There remains the factor of checker-brick spacing as a practical means of control on contact and on efficiency and completeness molecularly of the cracking involved in carburetion. It is of interest to note the variation in importance attached by practical operators to the relative amounts of cracking

[1] Loc. cit. (Proc. A. G. A. Tech. Section, 1922)

that are due to radiant energy and that due to energy imparted on impact or contact with checker-brick directly or indirectly. An instance of the latter is to be found in the case of the plant No. 7 cited above. On the other hand, there is the school that has shifted the checker-brick to the superheater and diminished their number. It would be of equal interest to learn the future experience of the two "schools" from the standpoint of meter troubles due to deposits.

It appears that the more tangible points of control, in the carbureting operation, over the composition of the light oil in the gas are temperature, rate of oil input, and checker-brick spacing. Then the question arises how shall the effects of changes be known. A suitably conducted small-scale scrubbing test with a subsequent examination of the light oil obtained, should furnish the answer. However, with the composition of the light oil determined, there is still lacking a set of standards to indicate the position of the sample in question with respect to the composition of samples taken from systems in which gum troubles are prevalent and from those in which such troubles are absent.

It is of interest in this general connection that the composition of a few light oils be briefly considered. In table 1 figures are given for coal gas from horizontal retort installations that are believed to represent the average and extreme compositions under normal operation. For coke oven gas an approximate average has been struck of published values and those that have become a part of the writer's experience. For carbureted water gas, the values given are believed to represent conditions as they existed several years ago.

The column headings are mainly self-explanatory. In the case of the column for washing loss, the value given includes those unsaturated hydrocarbons which become a part of the acid sludge, some sulphonated hydrocarbons such as orthoxylene, any basic materials present, most oxygenated bodies with hydroxyl radicals present, highly volatile hydrocarbons that escape with agitation and mechanical losses incident to the washing operation. The "residue over 200 deg. C." includes small amounts of naphthalene and wash-oil plus those unsaturated hydrocarbons which have been polymerized by the strong acid used in the

TABLE 1.

Composition of Light Oil in Per Cent.

Type of gas Plant	Benzene	Toluene	Sol. Naphtha 140-200°C.	Washing loss	Residue over 200°C.	Yield per M cu. ft. L.O. in gals.
Coal gas—horizontal retorts						
A	44.8	20.9	10.2	10.0	13.4	0.254
B	68.5	17.7	3.7	2.5	7.2	0.304
C	58.8	12.8	13.1	5.7	8.4	0.403
Coal gas—coke oven						
Averages	65	15	15	6-8%	—	.25-.30
Carbureted water gas						
A	39.9	21.6	14.1	11.4	12.4	0.508
B	45.5	20.8	18.5	14.7	—	0.527
C	22.1	18.8	15.1	15.5	28.2	0.413
D	52.6	23.6	4.1	11.5	8.0	0.304
E	35.1	24.6	14.8	13.3	12.3	0.311
F	50.2	31.1	4.2	8.4	6.1	0.500

washing operation and by the heat so generated and in distilling off the oils up to 200 deg. C.

From the data given in Table 1, which is representative of that from which it has been taken a number of points of interest and pertinency are evident. Excepting the gases from plants D and E, which were mixed with relatively richer coal gas for distribution, the light oil content of carbureted water gas was from 50 to 100 per cent greater than that of coal gas. It was at that time true that in general, carbureted water gas possessed a benzene content that was lower and a toluene content higher than was the case for coal gas. As expressed in the values given in the three remaining columns, the unsaturation of the light oil content of carbureted water gas is considerably higher than that of coal gas.

In the cases of D & F, attention is called to the high benzene and toluene contents and the relatively low solvent naphtha, washing loss, and "over 200 deg. C." figures. It has been reported that trouble due to gummy deposits has never been experienced in either of these two plants. The gas from E was distributed mixed with coal gas and has given rise to no trouble. In the case of A, trouble was experienced upon cessation of "stripping" and because of the greatly increased oxygen content. Gas from plant "B" being partially stripped has shown only traces of gummy deposits.

In plant C, the extremely low benzene and toluene contents, and the high values for solvent naphtha, washing loss, and particularly the "residue over 200 deg. C." are to be noted. It is to be recorded that this plant was "swamped" at the time these data were taken, with gummy and resinous material. The situation was righted before the meters were affected. The period was that of peak prices for toluene and apparently first attempts to increase toluene production resulted in considerable incomplete cracking.

As previously stated, the values which pertain to the light oil content of carbureted water gas were determined a number of years ago. In those states in which the heating value standards are fixed by State Commissions, the present standards have in nearly all cases become effective within the last few years. These years have, in general, constituted a period of change in standards, in oil input, and in operation. Thus, the need for data on light oil composition as found in carbureted water gas of the present day again appears. In order to judge effects, following changes, or variations in carbureting practice, from the standpoint of gum-forming constituents, the composition of the light oil in the resulting gas is essential. As stated in an earlier paragraph a set of standard figures are likewise essential as a basis of comparison.

Cooling and Condensation. The total physical functions of those units comprising the cooling and condensing system, is to remove those materials in the gas which would in the natural course of distribution give rise to deposits. These are undesirable in many ways. Stoppages and interference with the operation of the chemical purification units and with the functioning of meters and appliances must be avoided. The general physical factors involved are (1) temperature; (2) time; and (3) contact. More specifically, these are the degree and rate of cooling and the amount and character of surface employed. As above stated, the primary function is to remove carbon particles and all other carbonaceous

materials which go to constitute tar, excess steam, and those oil vapors which will condense at the temperature of the pipes of the distributing system. The removal of heat to produce lower temperatures — effecting condensation—is a means to this end. Contact with cold surfaces is a means of obtaining cooling of the gas and a mechanical means of removal of particles of all kinds. The rate of cooling influences strongly the manner of bringing down particles and condensate and also the character of the condensate — the tar. Obviously, the composition of the gas, with special respect to its light oil content, is dependent to the degree indicated on the cooling and condensing system. The measure of the work of the cooling and condensing system, considered in a broad sense, should, therefore, be expressible in terms of suspended matter and of the light oil of the gas as sent out. In the case of the first, methods of measurement are known (and have been standardized)[1] which employ filtration of the gas. Commercial types of apparatus are known as "tar camera." The composition of the light oil of the gas is probably best studied after its removal by a "scrubbing" device of some type.

In the case of suspended matter, the amount should be very low, if not zero. As to the composition of light oil that will not give rise to gum troubles, it is less easy to say, for variations enter that are incident to the individual plant and due to weather conditions, viz.,—the average period of storage, air temperature, distribution velocities in the mains and pipes, ground temperatures and others. If the entire light oil content of any carbureted water gas shown in the Table above were benzene, no condensation should occur even at minimum ground temperature (30-40 deg. F.) This is true because the vapor pressure of benzene is such that the "carrying capacity" of the gas at those temperatures is at least double what the actual maximum content would be. However, the presence of the toluene and high boiling fractions make the actual situation quite different. In examining the drip oils collected from some twenty different plants during 1922, it was found[2] that notwithstanding some expected variation in the composition, the benzene content was strikingly and uniformly low—roughly, 5 per cent by volume. The toluene was similarly low though relatively higher. The remaining portion, previously called the solvent naphtha fraction, is responsible for the condensation, and by reason of unsaturated content, very largely responsible for the gum and resin in pipes and meters. The reasons were discussed in the earlier paper. Theoretically considered, the removal at the plant by condensation or otherwise, of all the high boiling oils which the gas will not carry when it cooled to the temperature of the ground mains is desirable. Practically, however, this is not done. The evidence collected in the survey of plants and conditions of 1922, indicated that in those systems in which gummy deposits were most pronounced, this was not being accomplished before the gas reached the consumers' meters. The evidence for this was the presence of the high boiling drip oil and gummy material in the outmost drip pots and meters. In those systems with meters free from deposits, there were insignificant amounts of condensate collecting in the meters even after many years of service where excess diaphragm

[1]Katz, S. H. and Smith, G. W., Report of Investigations, Serial No. 2378, Bureau of Mines. Determination of suspended matter in gases by collection on filter paper.
[2]By the writer and H. G. Berger, Junior Chemist, U. S. Bureau of Mines, unpublished.

dressing or dipping diaphragms were present. The outer drip pots collected condensate that was practically all water. Here, the condensation was practically complete shortly after the gas entered the ground mains.

Purification. The purification of gas in the majority of carbureted water gas plants consists primarily in the removal of the hydrogen sulfide which it contains. At the present time, the greater part of this removal is carried out by the use of active oxides of iron. For practical purposes, the reactions revolved in the removal and in the regeneration of the oxide material may be written.

$$6H_2S + 2Fe_2O_3 = 2Fe_2S_3 + 6H_2O$$
$$2Fe_2S_3 + 3O_2 = 2Fe_2O_3 + 6S$$

From these reactions it follows that for every 100 grains of H_2S per 100 cu. ft. of gas about 0.08 per cent of oxygen is theoretically required for revivification of the oxide. Carbureted water gas contains usually from 100 to 150 grains of H_2S and the oxygen requirements are therefore .08% to 0.12%. The survey of 1922 showed the approximate average input was 0.8 per cent or from 7 to 10 times the theoretical requirements. The excess oxygen[1] which passes the oxide boxes has three principal points of consumption, first, through corrosion of pipes and meters, second, through oxidation of the hydrocarbons of the gas particularly the unsaturated ones giving rise to gummy deposits including water soluble organic acids, as brought out in the earlier paper, and third, in aiding in combustion of the gas at the point of its consumption. From the standpoint of the present consideration, gummy deposits as well as corrosion and corrosion deposits, this excess oxygen in the gas is an undesirable constituent. The writer has been unable to find any published information which would fix a practical working minimum input of oxygen. There is a distinct need for data that will permit the plotting of percentage of revivification against the oxygen content of the gas as it enters the purifier boxes, other operating conditions being kept constant. The oxygen in the gas plays a very definite role in gum formation and for the minimizing of deposits the excess oxygen should be cut to the lowest possible figure. A set of analyses which the author has collected shows that, whereas, the oxygen content of the gas leaving the plant was 1 per cent, at one mile from the plant, it had fallen to 0.9 per cent, and at a distance of several miles, the oxygen found was 0.40 per cent. Assuming the correctness of the analyses, about 0.5 per cent went into corrosion and gum formation in this case.

Summary

On the basis that the formation of gummy deposits is due to the amount and character of hydrocarbon constituents (particularly the unsaturated ones) and the oxygen content, it is held, subject to the limitations imposed by the character of the gas oil used, that the place of primary control of gummy deposits (through the composition of the light oil content of the gas) is in the carbureting units, for there is to be found their pyrogenetic origin. The secondary control is to be found in the cooling and condensing system (considered in the broadest sense) which serves as the agency for the removal of the undesirable solid or liquid materials leaving the generators. The control of the oxygen obviously lies in the operation of the purification boxes.

[1] Liquid purification systems do not present this factor of excess oxygen.

State Rules or Laws Governing the Heating Value of Gas

(Applicable primarily to manufactured gas; to natural gas only as noted)

TABLE 1.

Taken from "Tabulation of State and Municipal Gas Standards Now in Force," as rechecked by Bureau of Standards up to February 1, 1923. This work of the Bureau is with a view to bringing up to date Section X of Circular 32, and we are printing herewith the State Standards only, relating to Heating Value. (Editor's Note.)

State	Total Heating Value Required B.t.u. per cu. ft. Max.	Min.	Monthly Average	Minimum volume of sales above which calorimeter is required. Millions—cu. ft.	Specified Frequency of Test	Specified Place of Test	Date Effective
Arizona	——	550	600	——	——	Within 1 mile radius from distribution center.	May 1, 1915
California [1, 2]	600	540	[3]570	20	Daily f annual sales exceed 50,000 M; at least 3 days a week if less.	1 mile from distribution center.	Sept. 1, 1919
Colorado [1]	——	525	575	20	At least 4 days a week.	Within 1 mile of manufacturing plant.	Jan. 1, 1917
Connecticut [1]	——	[4]528	——	20	At least 3 days a week.	Within 1½ miles of manufacturing plant.	Oct. 1, 1918
District of Columbia [1]	——	[5]550 daily average	600	——	Daily.	Commission testing stations.	Sept. 1, 1914
Illinois [1]	——	530	[6]565	15	At least 5 days a week.	Within 1 mile of plant and at a point of consumption.	Jan. 1, 1921
Indiana [1, 2]	600	540	[7]570	All companies	At least once a day, Sundays and holidays excepted.	Near center of consumption in city where gas is made or city nearest where gas is made and at point approved by Commission.	May 1, 1920
Kansas (natural gas)	——	800	——	20	At least twice a week by utility or pipe-line or producing company.	——	Jan. 26, 1915
Maine [1]	555 daily average	495 daily average	[8]525	10	Daily—Sundays and holidays excepted. If annual sales less than 50,000 M, not less than 3 days a week.	Within 1 mile of manufacturing plant, in smaller communities lesser distance if desirable. At point approved by Commission.	July 1, 1921
Maryland [1, 2]	——	550	[9]600	15	If annual sales are 15,000 M to 30,000 M, at least 3 days a week; if sales exceed 30,000 M, each working day.	Within 1 mile of manufacturing plant.	July 1, 1915
Massachusetts	——	[10]528	——	15	At least twice a year and as much oftener as board requires.	Not less than ¼ mile from manufacturing plant.	Jan. 1, 1918
Missouri [1, 2]	——	520	570	20	At least 3 days a week. Natural gas at least 3 days a year.	Within 1 mile of manufacturing plant.	Oct. 1, 1915
Montana [1]	505 daily average	445 daily average	[8]475	10	At least 3 days a week.	Within 1 mile of manufacturing plant.	Jan. 3, 1921
Nevada	——	500	550	5	Periodic.	Within 1 mile radius from distribution center.	Sept. 3, 1911
New Hampshire	——	550	565	20	At least 3 days a week.	Within 1 mile radius from manufacturing plant.	Mar. 30, 1917
New Jersey	——	515 525 daily average	——	20	Periodic.	Within 1 mile radius from distribution center.	Nov. 9, 1921
New York [2]	——	5% below 585 for average of 3 consecutive days	[11]585	20	Daily.	Within 2 mile radius from manufacturing plant.	Jan. 1, 1917
Principal cities (See Table 2)	5% above Mo. Av. on any 3 consecutive days	525 daily average on any 3 consecutive days	537	—	Daily	——	Oct. 1 and 15, 1922
North Carolina [1]	570 daily average	510 daily average	[8]540	10	Daily—If sales less than 50,000 M, at least 3 days a week.	Within 1 mile from manufacturing plant.	Jan. 1, 1921

North Dakota [1]	550	500	525	All companies	Daily—Sundays and holidays excepted.	Within 1 mile from manufacturing plant.	Jan. 1, 1921
Oregon [1]	——	550	570 oil gas 600 other gas	10	At least 3 days a week.	Within a mile radius from manufacturing plant, or, if made out of city, at or near center of consumption or at a regular laboratory of commission.	July 1, 1914
Pennsylvania [2]	——	500 800 natural gas	[3]520	20	At least 3 days a week. Natural gas at least 3 times a year.	Within 1 mile radius from manufacturing plant.	Dec. 13, 1920
South Carolina [2]	570	510	[3]540	10	Daily—Sunday and holidays excepted. If annual sales less than 50,000 M, at least 3 days a week.	Within 1 mile from manufacturing plant.	Oct. 1, 1922
Washington [2]	——	550	600	10	At least weekly.	——	May 1, 1912
Wisconsin	5% above average	4% below average	520	20	At least 3 days a week.	Within 1 mile radius from distribution center.	Jan. 1, 1921

1. These States define "monthly average."
2. State rule does not apply in some cities. See municipal standards.
3. "In any city and county, or city or town where the absolute pressure of gas in the consumers' meters (defined as the sum of the average local barometric pressure and the average pressure of the gas above atmospheric pressure) is less than equivalent to twenty-nine inches of mercury pressure, any statement published by the utility as to the average heating value of the gas supplied shall indicate both the heating value per cubic foot measured under standard conditions and the heating value per cubic foot measured under the total pressure of gas in the meters of the customers of that city, in order that the heat available per cubic foot of gas paid for may be made clear."
4. Gas delivered to mains at above 2 pounds pressure to be tested before compression.
5. If a heating value test by any company shows a total heating value less than 600 Btu at least one other test shall be made on same day and the average of results of tests thus obtained shall be taken as the daily total heating value of the gas for that day.
6. For gas carried at 5 pounds pressure or higher the values specified are: Minimum 520 Btu, Monthly average, 530 Btu.
7. When gas is compressed and transmitted to other municipalities or communities, for purposes of information, heating value tests shall be made before and after compression.
8. In Maine, Montana, North Carolina and South Carolina, if for good and sufficient reason a utility finds this heating value impracticable or uneconomical, and in addition Montana, North Carolina and South Carolina specify "in case of by-product coke-oven gas," it shall file a statement with the Commission and after investigation Commission may by special order fix such lower standard as may be deemed proper. In Maine, Montana, North Carolina, South Carolina, and Pennsylvania where manufactured gas is delivered to mains under pressure above 5 pounds per square inch the heating value may be determined before compression.
9. In case any utility finds it impracticable to manufacture gas of the heating value specified at reasonable cost to consumer and shall file application with commission so stating, commission may by special order establish lower standard for such particular utility.
10. A penalty of $100 attaches where gas falls below standard on three consecutive inspections, or on three inspections made within a period of 30 consecutive days. No other State provides such specific penalty.
11. These requirements apply only to companies supplying 20,000 M or more cubic feet per year; companies supplying less than this amount may, however, exercise the option to adopt the same standard to be under the same general requirements. By special ruling the Niagara Light, Heat and Power Company is allowed to supply coke-oven gas of 550 Btu monthly average and 525 Btu minimum 3-day average and 500 Btu absolute minimum. Manufactured gas delivered to mains at a pressure above 5 pounds per square inch shall be tested for heating value before compression.

TABLE 2

New York State

	Max.	Min.	Mon.	Specified Frequency of Test	Specified Place of Test	Kind of Gas	Date Effective
Albany	5% above monthly average on any 3 consecutive days	525 daily average on any 3 consecutive days	537	Daily	——	Water	Oct. 15, 1922
Amsterdam	do	do	537	do	——	Water and coal	do
Beacon	d	do	537	do	——	Water	do
Binghamton	do	do	537	do	——	do	do
Cohoes	do	do	537	do	——	do	do
Cortland	do	do	537	do	——	Coal	do
Freeport	do	do	537	do	——	Water	do
Fulton	do	do	537	do	——	Water and coal	do
Geneva	do	do	537	do	——	Coke-oven	do
Glen Cove	do	do	537	do	——	Water	do
Gloversville	do	do	537	do	——	do	do
Hudson	do	do	537	do			
Ithaca	do	do	537	do	——	Water and coal	do
Kingston	do	do	537	do	——	do	do
Lockport	do	do	537	do	——	do	do
Mt. Vernon	do	do	537	do	——	Water	do
Newburgh	do	do	537	do	——	Water	do
New York City [3]	do[4]	do	537	do	At least 1 mile from place of manufacture or distribution.	Water and coal	Oct. 1, 1922
North Tonawanda	do	do	537	do	——	Water and coal	Oct. 15, 1922
Norwich	do	do	537	do	——	Water	do
Nyack	do	do	537	do	——	do	do
Oneida	do	do	537	do	——	do	do
Oneonta	do	do	537	do	——	do	do
Ossining	do	do	537	do	——	do	do

Peekskill	do	do	537	do		———	do	do
Port Washington	do	do	537	do		———	do	do
Poughkeepsie	do	do	537	do		———	do	do
Rensselaer	do	do	537	do		———	do	do
Rochester	do	do	537	do		———	Water and coal	do
Schenectady	do	do	537	do				
Syracuse	do	do	537	do		———	Water	do
Tonawanda	do	do	537	do		———	Water and coal	do
Troy	do	do	537	do		———	Water	do
Utica	do	do	537	do		———	do	do
Watertown	do	do	537	do		———	Water and coal	do
Buffalo	do	do	537	do		———		Dec. 15, 1922
Middletown	do	do	537	do		———		do
Port Jarvis	do	do	537	do		———		do

* * *

Statement of the Ownership, Management, Circulation, etc., Required by the Act of Congress of August 24, 1912.

Of American Gas Association Monthly published Monthly at Brattleboro, Vermont, for April 1, 1923. State of New York. County of New York.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Thomas Scofield who, having been duly sworn according to law, deposes and says that he is the Editor of the American Gas Association Monthly and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, American Gas Association, Inc., 342 Madison Ave., New York, N. Y. Editor, Thomas Scofield, 342 Madison Ave., New York, N. Y. Managing Editor, None. Business Managers, None.

2. That the owner is: (If the publication is owned by an individual his name and address, or if owned by more than one individual the name and address of each, should be given below; if the publication is owned by a corporation the name of the corporation and the names and addresses of the stockholders owning or holding one per cent or more of the total amount of stock should be given.) American Gas Association Inc. No stock issued.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

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5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is Not Required. (This information is required from daily publications only.)

(Signed) T. Scofield.

Sworn to and subscribed before me this 18th day of April, 1923.

(Seal) (Signed) Florence Aten Ives.

(My commission expires March, 30, 1924.)

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A. B. MACBETH	Los Angeles, Cal.
CHARLES A. MUNROE	Chicago, Ill.
H. S. REESIDE	Washington, D. C.
H. S. SCHUTT	Philadelphia, Pa.

Section Officers

ACCOUNTING—Chairman	J. W. HEINS	Philadelphia, Pa.
Vice-Chairman	W. A. SAUER	Chicago, Ill.
Secretary	H. W. HARTMAN	Ass'n Headqtrs.
ADVERTISING—Chairman	B. J. MULLANEY	Chicago, Ill.
Vice-Chairman	J. M. BENNETT	Philadelphia, Pa.
Secretary	C. W. PERSON	Ass'n Headqtrs.
COMMERCIAL—Chairman	WM. GOULD	Boston, Mass.
Vice-Chairman	J. E. DAVIES	Chicago, Ill.
Secretary	LOUIS STOTZ	Ass'n Headqtrs.
MANUFACTURERS—Chairman	F. A. LEMKE	Kalamazoo, Mich.
Vice-Chairman	G. W. PARKER	St. Louis, Mo.
Secretary	C. W. BERGHORN, JR.	Ass'n Headqtrs.
TECHNICAL—Chairman	F. C. WEBER	New York, N. Y.
Vice-Chairman	H. C. WEHNERT	St. Louis, Mo.
Secretary	H. W. HARTMAN	Ass'n Headqtrs.

SECRETARY-MANAGER	OSCAR H. FOGG	Ass'n Headqtrs.
ASS'T SECRETARY-MANAGER	LOUIS STOTZ	Ass'n Headqtrs.
ASS'T SECRETARY-MANAGER	N. T. SELLMAN	Ass'n Headqtrs.